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ABSTRACT

This book contains information about a project instituted in 1990 by the National Institute for Occupational Safety and Health (NIOSH) to prevent work-related diseases and injuries among agricultural workers. Included are facts about 25 projects within NIOSH and 42 cooperative agreements between NIOSH and institutions in 25 states. These initiatives include surveys as well as research, intervention, surveillance, and demonstration programs. The 67 projects described in this report for 1992 address the prevention of the following work-related diseases and injuries: occupational lung diseases, musculoskeletal injuries, cancer prevention, serious occupational traumatic injuries, cardiovascular diseases, neurologic disorders, reproductive disorders, noise-induced hearing loss, dermatological conditions, psychological disorders, and infectious diseases. Most of the book is made up of fact sheets describing the funded projects. They contain such information as the personnel and skills involved, project objective, and the diseases and injuries addressed. The fact sheets consist of an executive summary, linkages with other institutions, intervention, research, intervention, assessment, and outcome. The fact sheets are organized by state, and within each state by the organization involved. A directory, also alphabetical by state, lists each project, organizational sponsor, address, telephone numbers, and project director. An acronym list and a subject list are provided. (KC)

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1992 Project Facts
The National Program for Occupational Safety and Health in Agriculture

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

1992 Project Facts:

The National Program for Occupational Safety and Health in Agriculture

U.S. Department of Health and Human Services
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Foreword

In 1990, the Congress directed the National Institute for Occcupational Safety and Health (NIOSH) to undertake and lead a series of inititiatives in surveillance, research, and intervention, which when sustained over a period of time, would significantly and measurably reduce diseases and injuries among rural Americans. This program in agricultural occupational safety and health is dedicated to preventing Work-Related Diseases and Injuries that affect Americans who work in agriculture, whether rural or urban. It also includes the preventive activities related to timbering and commercial fish harvesting.

This document, *1992 Program Facts: The National Program for Occupational Safety and Health in Agriculture*, provides detailed information about this program. These facts are for use by the various partners with whom NIOSH works in the program. To assist our partners, *1992 Program Facts* provides a description and a directory of people involved in the program.

We hope that, with the aid of this document, our partners will be able to work more closely and collaboratively in preventing the Leading Work-Related Diseases and Injuries that affect American agricultural workers and their families.

J. Donald Millar, M.D., D.T.P.H.(Lond.)
Assistant Surgeon General
Director, National Institute for
Occupational Safety and Health

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Introduction

Executive Summary

In 1990, the National Institute for Occupational Safety and Health (NIOSH) initiated a program in agricultural safety and health. This program is dedicated to preventing Leading Work-Related Diseases and Injuries among Americans engaged in agricultural work.

1992 Project Facts presents information about each of the elements in this program. Included are facts about 25 projects within NIOSH and 42 cooperative agreements between NIOSH and institutions within 25 different states. These initiatives include surveys as well as research, intervention, surveillance, and demonstration programs.

The 67 extramural and intramural projects that are described within this document for the year 1992 address the prevention of the following Work-Related Diseases and Injuries:

- 8 address occupational lung diseases,
- 7 address musculoskeletal injuries,
- 8 address various aspects of cancer prevention,
- 29 address serious occupational traumatic injuries,
- 1 addresses cardiovascular diseases,
- 15 address neurologic disorders,
- 4 address reproductive disorders,
- 11 address noise-induced hearing loss,
- 4 address dermatological conditions,
- 4 address psychological disorders, and
- 2 address infectious diseases.

Background

About NIOSH. NIOSH is the national public health organization responsible for the occupational safety and health of all the nation's workers. NIOSH is responsible for protecting and promoting the health and safety of workers and is dedicated to "primary prevention," which is targeted at controlling the root cause of a problem. When Congress created NIOSH in 1970 by enacting the Occupational Safety and Health Act, one of the priorities of the new Institute was to launch a national initiative to improve the health and safety of agricultural workers and their families. This program consists of several components:

1. Survey. NIOSH undertook a Farm Family Health and Hazard Survey to develop more complete information on the circumstances of agricultural injury and disease problems. Based on this information, informed priorities were able to be set for prevention and a baseline for measuring improvement could be established.

2. Research. To ensure that preventive actions are taken based upon scientific findings, including the etiology of injuries and diseases, NIOSH conducted research both intramurally and through university-based Centers for Occupational Safety and Health in Agriculture.

3. Intervention. To actively promote and implement the research findings, NIOSH established a national Agricultural Health Promotion System (APHS) in collaboration with land grant universities. Funds were provided for training traditional occupational safety and health professionals in agricultural safety and health.

4. *Surveillance.* To monitor results, NIOSH established an Agricultural Health Nurse Program, in which rural hospitals would provide ongoing responsive surveillance (focused at intervention) to identify agriculture-related disease and injury problems through the support of nurses in rural hospitals.

5. *Demonstration.* NIOSH also devised an early detection strategy to reduce the number of cancer deaths among farmers through Cancer Control Demonstration Projects for Farmers.

In 1983, to help establish priorities for the field of occupational safety and health, NIOSH suggested a list of leading work-related diseases and injuries and proposed national strategies to prevent each of them. In 1990, Congress targeted agricultural workers as a particular population at risk that NIOSH should address with its program. Farms have become fewer and larger and agricultural production concentrated. Farm operators and their unpaid family members continue to provide the major portion of labor in agricultural, though hired workers have gradually displaced family workers on farms, increasing from 23 percent in 1950 to 35 percent in 1989. In 1990, NIOSH launched a program in agricultural safety and health dedicated to preventing work-related diseases and injuries in the industrial category of agriculture, whether rural or urban. This also includes the activities of timber and commercial fish harvesting. Diseases and injuries among agricultural workers and their families that are addressed by the NIOSH program are:

1. *Occupational lung disease.* These include hypersensitivity pneumonitis (farmers' lung), asthma, chronic bronchitis (hog lung), organic dust toxic syndrome (silo loaders' syndrome, grain fever), and mucous membrane irritation.

2. *Occupational cancers.* These are leukemia, non-Hodgkin's lymphoma, multiple myeloma, soft-tissue sarcoma, and cancers of the brain, skin, lip, stomach, and prostate.

3. *Musculoskeletal injuries.* These include carpal tunnel syndrome, tenosynovitis, epicondylitis, peritendinitis and tendinitis, milker's knee, and tractor drivers' syndrome.

4. *Severe occupational traumatic injuries.* These include machine-related fatalities, electrocutions, suffocation, suicides, amputations, and eye injuries.

5. *Occupational cardiovascular diseases.* This includes heat stroke.

6. *Disorders of reproduction.* Included are miscarriages and infertility.

7. *Neurotoxic disorders.* These include dementia, neurologic dysfunction, etc.

8. *Noise induced hearing loss.* Peculiar to agriculture is unidirectional hearing loss.

9. *Dermatological conditions.* In addition to dermatitis, this includes burns and lacerations.

10. *Psychological disorders.* These include dementia, depression, stress, and suicide.

11. *Infectious diseases.* Some of these are zoonosis, tuberculosis, and rabies.

NIOSH Grants. The National Institute for Occupational Safety and Health issued five Federal Register notices in 1990, inviting various organizations to develop projects related to agricultural safety and health matters. These projects ranged from setting up studies of farm hazards and pesticide-related health problems to developing centers for longer range work with education involving farm families. Different grants were specifically directed to universities, medical staff, or agricultural extension workers. The five basic types of projects for which grants were available were : (1) Farm Family Health and Hazard Surveys (FFHHS); (2) Centers for Agricultural Disease and Injury Research, Education, and Prevention (CADIREP); (3) Agricultural Health Promotion Systems (AHPS); (4) Occupational Health Nurses in Agricultural Communities (OHNAC); and (5) Demonstration Cancer Control Projects for Farmers (DCCPF). There were numerous responses and those awarded grants represented 24 states.

NIOSH Projects. In addition, NIOSH Divisions in Cincinnati, Ohio, and Morgantown, West Virginia, undertook 25 projects. These projects address the five basic types of projects and generally deal with surveillance, research, or intervention.

What This Book Contains

Fact Sheets. Those organizations awarded grants as well as the NIOSH Divisions were asked to prepare information on how their particular project was established and carried out thus far. These fact sheets were to address specific information such as the personnel and skills involved; the project's objective; and the diseases, injuries, and hazards addressed; and were to include an executive summary, prevention activities, and an evaluability assessment. The executive summary was to include the geographic area and results to date. Under prevention activities, participants were asked to identify linkages with other institutions and to discuss surveillance (including problem recognition, diagnostic criteria, reporting, and linkage to response), research (including etiology, methodology, and control), and intervention (including populations at risk, risk factors, and control actions). The assessment of evaluability was to present criteria for dissemination effectiveness, the impact on target audiences, and associated outcome.

These fact sheets comprise the bulk of this book. The information, collected in January 1992, is organized by state, and within each state by the organization involved. Each fact sheet has a unique number, as, for example, AZ-1 is the first (and only) project in Arizona. CA-1, CA-2, and CA-3 represent three different projects in California. The NIOSH projects are listed under their respective state — Ohio or West Virginia — but are numbered as NIOSH-1, NIOSH-2, etc.

Directory. The directory, also alphabetical by state, lists each project, its organizational sponsor, with address and phone numbers, and its project director(s). The project director's name is current as of December 1992.

Acronyms and Index. At the back of the book you will find an acronym list and an index by subject or subjects of the project.

Distribution

This book is being distributed to the extramural partners, i.e., everyone listed in each project, plus personnel at NIOSH and other Federal agencies.

Acknowledgments

There are several individuals and organizations whose contributions we would like to acknowledge. These include the recipients of agricultural safety and health grants for cooperative agreements awarded by NIOSH. These grantees were particularly helpful in developing the Fact Sheets that comprise this book. We also wish to thank the NIOSH principal investigators of these grants who gave so willingly of their time and talents in developing the Task Force meeting which led to this publication. To Melvin L. Myers, who chaired the entire event, we can only say, "Well done!" The persistence of everyone involved in agricultural safety and health is both heartwarming and gratifying.

Finally, we express grateful appreciation to Diane C. Allen and Betty H. Dryden, NIOSH project officers for this event and this document, and to Rachel F. Elmore and Amy A. Huston for their efforts in bringing this task to fruition, along with the collaborative efforts of Barbara Robinson and Claire Friday of the HCR Company.

For Additional Information

For additional information about this program or about safety and health in agriculture in general, call 1-800-35-NIOSH.

Directory of Projects

Explanation

Projects are listed by state and number, and show the title, type, and the address, phone number, and name of the person responsible for the project. Each project has been categorized according to the type of project asked for in the solicitation. These types are:

AHPS = Agricultural Health Promotion Systems.
CADIREP = Centers for Agricultural Disease and Injury Research, Education, and Prevention.
DCCPF = Demonstration Cancer Control Projects for Farmers.
OHNAC = Occupational Health Nurses in Agricultural Communities.
NIOSH = Projects undertaken directly by the National Institute for Occupational Safety and Health. The projects listed here are under the direction of NIOSH officials in Ohio or West Virginia, and are listed under the respective state. They are, however, national in scope.
FFHHS = Farm Family Health and Hazard Surveys.

State	Title of Project and Type	Institution, Address	Project Director
Arizona AZ-1	Arizona Agricultural Health Promotion Systems **(AHPS)**	University of Arizona 715 N. Park, 2nd Floor Tucson, AZ 85719 602-621-7176 FAX 602-626-8688	Lance Fluegel
California CA-1	Nurses Using Rural Sentinel Events **(OHNAC)**	California Public Health Foundation California Occupational Health Program 2151 Berkeley Way, Annex 11 Berkeley, CA 94704 510-540-3141 FAX 510-540-3472	Linda Rudolph, M.D.
CA-2	Center for Agricultural Disease and Injury Research, Education, and Disease and Injury Prevention **(CADIREP)**	UC Ag. Health and Safety Center at Davis University of California ITEH Bldg., Old Davis Road Davis, CA 95616-8757 916-752-4050 FAX 916-752-5047	Marc B. Schenker, M.D., M.P.H.
CA-3	California Agricultural Health and Safety Promotion System **(AHPS)**	University of California Agricultural Engineering Extension Davis, CA 95616 916-752-1613 FAX 916-752-2640	William E. Steinke, Ph.D.
Colorado CO-1	Colorado Farm Family Health and Hazard Surveillance **(FFHHS)**	Colorado State University Dept. of Environmental Health Fort Collins, CO 80523 303-491-6156 FAX 303-491-1815	Lorann Stallones, Ph.D.
CO-2	High Plains -- Intermountain Center for Agricultural Health and Safety **(CADIREP)**	Colorado State University 110 Veterinary Science Bldg. Fort Collins, CO 80523 303-491-6151 FAX 303-491-7778	Roy M. Buchan, Dr.P.H.
CO-3	Promoting Agricultural Safety and Health in Colorado **(AHPS)**	Colorado State University Fort Collins, CO 303-491-6172 FAX 303-491-7369	Paul D. Ayers, Ph.D.

State	Title of Project and Type	Institution, Address	Project Director
Florida FL-1	Florida's Agricultural Health Promotion System **(AHPS)**	Institute of Food and Agricultural Sciences University of Florida Gainesville, FL 32611 904-392-2468 FAX 904-392-4092	William J. Becker, Ph.D.
Georgia GA-1	Georgia's Healthy Farmers Project **(AHPS)**	Georgia Division of Public Health 878 Peachtree Street, N.E., Room 100 Atlanta, GA 30309-9844 404-894-4283 FAX 404-894-9242	Barbara Brown
Iowa IA-1	Occupational and Safety Surveillance through Health Departments and Nurses in Agricultural Communities **(OHNAC)**	Iowa Department of Public Health Lucas State Office Bldg. Des Moines, IA 50319-0075 515-281-5643 FAX 515-242-6284	Russell W. Currier, D.V.M., M.P.H.
IA-2	Agricultural Health Promotion Systems **(AHPS)**	Iowa State University 1085 Elm Hall Ames, IA 50111 515-294-4127 FAX 515-294-0918	August Ralston
IA-3	Cancer Control Project for Iowa Farmers **(DCCPF)**	Mercy University Hospital Foundation Sixth & University Des Moines, IA 50314 515-247-3248 FAX 515-243-5633	Roscoe Morton, M.D.
IA-4	Center for Agricultural Disease and Injury Research, Education, and Prevention **(CADIREP)**	University of Iowa, Dept. of Preventive Medicine, Institute of Agricultural Medicine and Occupational Health 124 AMRF - Oakdale Campus Iowa City, IA 52242 319-335-4190 FAX 319-335-4225	James A. Merchant, M.D., Dr.P.H.
IA-5	Iowa Farm Family Health and Hazard Surveillance Project **(FFHHS)**	University of Iowa, Dept. of Preventive Medicine and Environmental Health, Institute of Agricultural Medicine and Occupational Health 134 AMRF Iowa City, IA 52242 319-335-4213 FAX 319-335-4225	William Popendorf, Ph.D.
Kansas KS-1	Agriculture Safety and Health Promotion System for Older Kansas **(AHPS)**	Kansas State University 237 Seaton Hall Manhattan, KS 66506 913-353-5813 FAX 913-532-6944	John A. Kramer, Michael Bradshaw, Earl Baugher
Kentucky KY-1	Traumatic Farm Injury Surveillance in Kentucky **(OHNAC)**	Kentucky Department for Health Services 275 East Main Street Frankfort, KY 40621 502-564-3418 FAX 502-564-6533	Carl W. Spurlock, Ph.D.

State	Title of Project and Type	Institution, Address	Project Director
KY-2	Kentucky Farm Family Surveillance **(FFHHS)**	Dept. of Preventive Medicine Rm. MS129X, College of Medicine University of Kentucky Lexington, KY 40536-0084 606-233-6836 FAX 606-258-1038	Robert McKnight, Sc.D.
Maine ME-1	Occupational Health Nurses in Agricultural Communities **(OHNAC)**	Maine Bureau of Health Department of Human Services State House Station #11 Augusta, ME 04333 207-289-5378 FAX 207-287-4172	Stephen C. Shannon, D.O., M.P.H.
Michigan MI-1	Michigan Agricultural Health Promotion Project **(AHPS)**	Michigan State University 223 A.W. Farrall Hall Agricultural Engineering East Lansing, MI 48824-1323 517-353-3737 FAX 517-353-8982	Howard J. Doss
MI-2	Michigan State University Farm Cancer Project **(DCCPF)**	Michigan State University B100 Clinical Center East Lansing, MI 48824-1313 517-353-1846 FAX 517-336-1326	Kenneth Rosenman, M.D.
Minnesota MN-1	Occupational Health and Safety Surveillance through Nurses in Agriculture **(OHNAC)**	Minnesota Department of Health 717 SE Delaware Street Minneapolis, MN 55440 612-623-5613 FAX 612-623-5775	Don Bishop, Ph.D.
MN-2	Cancer Control in Farmers Study **(DCCPF)**	University of Minnesota School of Public Health Box 807 Mayo, 420 Delaware Street, SE Minneapolis, MN 55455 612-626-0900 FAX 612-626-5775	Jack Mandel, Ph.D.
Missouri MO-1	Cooperative Agricultural Promotions Agreement **(AHPS)**	University of Missouri-Columbia Columbia, MO 65211 314-882-2731 FAX 314-882-1115	David Baker
Nebraska NE-1	Harvest for a Lifetime **(DCCPF)**	State of Nebraska, Department of Health 301 Centennial Mall, PO Box 95007 Lincoln, NE 68509-5007 412-471-2647 FAX 412-471-0383	Joleen TenHulzen Huneke
New Jersey NJ-1	Agricultural Health Promotion Systems for New Jersey **(AHPS)**	Rutgers Cooperative Extension - Administration Martin Hall, Rm. 111, Cook Campus PO Box 231 New Brunswick, NJ 08903 908-932-9308 FAX 908-932-6769	Zane R. Helsel, Ph.D.
New York NY-1	Agriculture Health Nurse Program for New York State **(OHNAC)**	New York State Department of Health 2 University Place Albany, NY 12203-3399 518-458-6433 FAX 518-458-6434	James M. Melius, M.D., Dr.P.H.

State	Title of Project and Type	Institution, Address	Project Director
NY-2	Farm Family Health and Hazard Survey **(FFHHS)**	New York State Department of Health 2 University Place Albany, NY 12203-3399 518-458-6433 FAX 518-458-6434	James M. Melius, M.D., Dr.P.H.
North Carolina NC-1	Farm Injury Project **(OHNAC)**	DEHNR, Occupational Health Section PO Box 27687 Raleigh, NC 27611-7676 919-733-3730 FAX 919-733-9555	Susan A. Randolph
NC-2	North Carolina Agricultural Health Promotion Systems **(AHPS)**	North Carolina State University PO Box 7625 Raleigh, NC 27695-7625 919-515-6771 FAX 919-515-6772	Robert L. McLymore
North Dakota ND-1	Occupational and Safety Surveillance through Health Departments and Nurses in Agricultural Communities **(OHNAC)**	North Dakota State Department of Health and Disease Control, Consolidated Laboratories 600 E Boulevard Avenue Bismarck, ND 58505-0200 701-224-2378 FAX 701-224-4727	Larry A. Shireley
Ohio OH-1	National Surveillance in Agricultural Communities in Ohio **(OHNAC)**	Ohio Department of Health Bureau of Occupational Health PO Box 118 Columbus, OH 43266-0118 614-466-4183 FAX 614-752-8739	Nan Migliozzi, R.N., M.S.N., COHN
OH-2	Ohio Agriculture Health Promotion Systems **(AHPS)**	Ohio State University Agricultural Engineering Dept. 590 Woody Hayes Drive Columbus, OH 43210-1057 614-292-6519/9455 FAX 614-292-9446	Thomas L. Bean, Ph.D.
OH-3	Farm Family Health and Hazard Surveillance Program for Cash Grain Farmers in Ohio **(FFHHS)**	Ohio State University Department of Preventive Medicine 320 West 10th Avenue Columbus, OH 43210 614-293-3897 FAX 614-293-3937	J.R. Wilkins, III, Dr.P.H.
NIOSH-1	Biological Monitoring for Aryl Amines **(NIOSH)**	NIOSH, Mail Stop C-23 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8193 FAX 513-533-8510	Kenneth L. Cheever, M.S.
NIOSH-2	Methods for Determining Evidence of Spermatogenic Damage **(NIOSH)**	NIOSH, Mail Stop C-23 4676 Columbia Pkwy Cincinnati, OH 45226-1998 513-533-8210 FAX 513-533-8510	Steven M. Schrader, Ph.D.
NIOSH-3	Immunotoxicology Research and Support **(NIOSH)**	NIOSH, Mail Stop C-26 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8433 FAX 513-533-8510	Lloyd E. Stettler, Ph.D.

State	Title of Project and Type	Institution, Address	Project Director
NIOSH-4	Biological Monitoring Research and Support **(NIOSH)**	NIOSH, Mail Stop C-26 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8130 FAX 513-533-8510	Alexander W. Teass, Ph.D.
Ohio (cont.) NIOSH-5	In Vitro Systems for Human Biological Monitoring **(NIOSH)**	NIOSH, Mail Stop C-23 4676 Columbia Pkwy Cincinnati, OH 45226-1998 513-533-8207 FAX 513-533-8510	Mark Toraason, Ph.D.
NIOSH-6	Environmental Assessment of Exposure to Alachlor **(NIOSH)**	NIOSH, Mail Stop R-16 4676 Columbia Pkwy, R14 Cincinnati, OH 45226 513-841-4314 FAX 513-841-4540	Wayne T. Sanderson
NIOSH-7	Neurobehavioral Assessment of Pesticide Applicators **(NIOSH)**	NIOSH, Mail Stop C-24 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8383 FAX 513-533-8510	John Russo, Ph.D.
NIOSH-8	Immunologic Markers of Herbicide Exposure **(NIOSH)**	NIOSH, Mail Stop C-26 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8196 FAX 513-533-8510	Raymond E. Biagini, Ph.D.
NIOSH-9	Noise-Induced Hearing Loss: Support for FFHH Survey **(NIOSH)**	NIOSH, Mail Stop C-27 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8281 FAX 513-533-8510	Christa L. Themann, M.A.
NIOSH-10	Hearing Conservation Programs for Underserved Workers **(NIOSH)**	NIOSH, Mail Stop C-27 4676 Columbia Pkwy Cincinnati, OH 45226 513-533-8281 FAX 513-533-8510	John R. Franks, Ph.D.
NIOSH-11	Application of Process Hazard Analysis for Agricultural Chemicals **(NIOSH)**	NIOSH, Mail Stop R-5 Division of Physical Sciences and Engineering Cincinnati, OH 45226 513-841-4381 FAX 513-841-4506	Amy A. Beasley
NIOSH-12	Development of Analytical Methods for Agricultural Chemicals **(NIOSH)**	NIOSH, Mail Stop R-7 Division of Physical Sciences and Engineering Cincinnati, OH 45226 513-841-4392 FAX 513-841-4500	Eugene R. Kennedy, Ph.D.
NIOSH-13	Real Time Monitoring for Pesticides **(NIOSH)**	NIOSH, Mail Stop R-8 Division of Physical Sciences and Engineering Cincinnati, OH 45226 513-841-4279 FAX 513-841-4500	Judd C. Posner, Ph.D.
NIOSH-14	Aerosol Sampler Performance Testing **(NIOSH)**	NIOSH, Mail Stop R-7 Division of Physical Sciences and Engineering Cincinnati, OH 45226 513-841-4277 FAX 513-841-4500	David Bartley, Ph.D.

State	Title of Project and Type	Institution, Address	Project Director
NIOSH-15	Evaluation and Control of Workplace Hazards Using Video Exposure Monitoring **(NIOSH)**	NIOSH, Mail Stop R-14 Division of Physical Sciences and Engineering Cincinnati, OH 45226 513-841-4378 FAX 513-841-4486	Michael G. Gressel
Ohio (cont.) NIOSH-16	Study of Methyl Bromide Applicators: Exposure Assessment **(NIOSH)**	NIOSH, Mail Stop R-16 4676 Columbia Pkwy Cincinnati, OH 45226 513-841-4314 FAX 513-841-4486	Virginia Ringenburg
NIOSH-17	Study of Health Effects of Methyl Bromide on Fumigant Applicators **(NIOSH)**	NIOSH, Mail Stop R-16 4676 Columbia Pkwy Cincinnati, OH 45226 513-841-4481 FAX 513-841-4486	Geoffrey Calvert, M.D., M.P.H.
NIOSH-18	Case Control Study of Brain Cancer Among Farmers **(NIOSH)**	NIOSH, Mail Stop R-16 4676 Columbia Pkwy Cincinnati, OH 45226 513-841-4481 FAX 513-841-4486	Geoffrey Calvert, M.D., M.P.H.
NIOSH-19	Neurological Sequelae of Pesticide Poisoning **(NIOSH)**	NIOSH, Mail Stop R-13 4676 Columbia Pkwy Cincinnati, OH 45226 513-841-4203 FAX 513-841-4486	Kyle Steenland, Ph.D.
NIOSH-20	Pesticide Exposure among Peach Harvesters **(NIOSH)**	NIOSH, Mail Stop R-13 4676 Columbia Pkwy Cincinnati, OH 45226 513-841-4207 FAX 513-841-4486	Kyle Steenland, Ph.D. - NIOSH; John Ross - CA Dept. of Pest. Reg.
Oklahoma OK-1	Cooperative Agreement Program for Agricultural Health Promotion **(AHPS)**	Oklahoma State University 214 AG Hall Stillwater, OK 74078-0469 405-744-5427 FAX 405-744-6059	A. Pat Lewis, III
Pennsylvania PA-1	Agricultural Health Promotion Systems **(AHPS)**	Pennsylvania State University Agricultural Engineering, Rm. 246 University Park, PA 16802 814-865-7157 FAX 814-865-1031	Dennis J. Murphy, Ph.D.
Tennessee TN-1	Tennessee Agricultural Health Promotion System **(AHPS)**	University of Tennessee Agricultural Extension Service PO Box 1071 Knoxville, TN 37901-1071 615-974-7237 FAX 615-974-7448	Timothy G. Prather
Vermont VT-1	Agricultural Health Promotion System **(AHPS)**	University of Vermont Extension System RR 1 Box 2280 Morrisville, VT 05661 802-888-4972 FAX 802-888-2432	George L. Cook

State	Title of Project and Type	Institution, Address	Project Director
Virginia VA-1	Agricultural Health Promotion Systems for Virginia **(AHPS)**	Virginia Tech University 205 Seltz Hall Blacksburg, VA 24061-0303 703-231-5705 FAX 703-231-3199	G. H. Hetzel, Ph.D.
Washington WA-1	Washington State Agricultural Health Promotion System **(AHPS)**	Washington State University Agricultural Engineering Department Pullman, WA 99164-6120 509-335-2902 FAX 509-335-2722	W. B. Symons, Ph.D.
West Virginia NIOSH-21	Evaluation of Personal Protective Gloves for Use with Herbicides **(NIOSH)**	NIOSH Morgantown 944 Chestnut Ridge Rd. Morgantown, WV 26505 304-291-4337 FAX 304-284-5877 NIOSH Cincinnati 4676 Columbia Pkwy., MS R14 Cincinnati, OH 45226 513-841-4314 FAX 513-841-4540	Stephen P. Berardinelli, Ph.D.; Wayne T. Sanderson
NIOSH-22	Agricultural Lung Disease Research **(NIOSH)**	NIOSH, Division of Respiratory Disease Studies, Mail Stop 220 944 Chestnut Ridge Rd. Morgantown, WV 26505-2888 304-291-4474/284-5406 FAX 304-291-4938	Gregory R. Wagner, M.D.; Stephen A. Olenchock, Ph.D.
NIOSH-23	Rollover Protection for Agricultural Tractors **(NIOSH)**	NIOSH, Division of Safety Research 944 Chestnut Ridge Rd. Morgantown, WV 26505-2888 304-291-4809 FAX 304-291-4904	John R. Etherton
NIOSH-24	Musculoskeletal Injuries in Agriculture **(NIOSH)**	NIOSH, Division of Safety Research 944 Chestnut Ridge Rd. Morgantown, WV 26505-2888 304-291-4884 FAX 304-291-4904	Thomas G. Bobick
NIOSH-25	Grain Handling Injury and Fatality Prevention **(NIOSH)**	NIOSH, Division of Safety Research 944 Chestnut Ridge Rd. Morgantown, WV 26505-2888 304-291-4335 FAX 304-291-4904	Karl A. Snyder, Ph.D.
Wisconsin WI-1	Wisconsin Farmers Cancer Control Project **(DCCPF)**	Marshfield Clinic 1000 North Oak Ave. Marshfield, WI 54449-5790 715-389-3545 FAX 715-389-3880	Douglas Reding, M.D.
WI-2	Center for Agricultural Research, Education, and Disease and Injury Prevention Program **(CADIREP)**	National Farm Medicine Center 1000 North Oak Ave. Marshfield, WI 54449-5790 715-387-9298 FAX 715-389-3880	Paul D. Gunderson, Ph.D.; Dean T. Stueland, M.D.

State	Title of Project and Type	Institution, Address	Project Director
WI-3	Wisconsin Agricultural Health Promotion System **(AHPS)**	University of Wisconsin 460 Henry Mall Madison, WI 53706 608-262-0613 FAX 608-262-4556	Ronald T. Schuler, Ph.D.

Arizona (AZ-1)

Project Title: Arizona Agricultural Health Promotion Systems

Project Director: Lance Fluegel

Institution, Address:
The University of Arizona
715 N. Park, 2nd Floor
Tucson, AZ 85719
Phone: 602-621-7176 **FAX:** 602-626-8688

Personnel and Skills: Lance Fluegel, B.S., Agricultural Education, 261/2 years, farm safety, 41/2 years; Glen Miller, Ed.D., agricultural education, 20 years, research on the effects of noise in agricultural mechanics laboratories; Steve Schimpp, M.D., agricultural education, 8 years.

Problems (diseases, injuries, hazards) Addressed: Identifying and correcting hazards in educational institutions and the agribusiness workplace; developing and/or expanding safety education for agricultural students and workers; farm accident rescue training; agricultural accident and injury surveillance.

Project Objectives: Reduce agricultural work-related injuries and illnesses by establishing and expanding health and safety education programs for agricultural education students and workers.

Executive Summary

The geographic area is the state of Arizona. Results to date:

1. *Advisory Committee.* Organized an advisory committee of key agricultural interests consisting of representatives from Cooperative Extension, Public Health, and State Department of Arizona.

2. *Model Safety Programs.* Established agreements with 20 model safety program cooperators (10 agribusiness and 10 educational) to develop model safety programs for the purpose of originating methods and procedures for delivering safety education to agricultural students and workers.

3. *Hazard Surveys.* Developed agribusiness and educational hazard survey forms. Conducted hazard surveys of model safety programs and initiated hazard correction process.

4. *Bilingual Workshops.* Conducted four bilingual workshops for farmers on machinery and pesticide safety.

6. *PESTS Kits.* Developed four Pesticide Educational Safety Training Series (PESTS) kits for use by agricultural education departments and community colleges.

7. *Rescue Workshops.* Conducted three farm accident rescue workshops for farm workers and rescue personnel.

8. *Training Program.* Introduced program to train 4-H program leaders in first aid, CPR, home safety, nutrition, and youth fitness.

9. Curriculum Survey. Conducted safety curriculum survey of University of Arizona College of Agriculture instructors.

10. Safety Materials. Distributed 5,000 catalogs of available safety education materials. Published and distributed five safety newsletter issues (8,000 copies each issue). Developed and distributed three bilingual safety training posters in conjunction with the safety newsletter. Developed five safety quizzes to accompany safety newsletters distributed to agricultural education instructors.

11. Video. Developed a bilingual training video on *Using and Maintaining Personal Protective Equipment for Pesticides.*

12. Spanish Translation. Translated University of Arizona Landscape Safety Training Series (18 units) to Spanish.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): A study to determine the types of accident information presently available and where we will need to concentrate our surveillance studies has just been started.

2. Research (etiology, methodology, control): None.

3. Intervention (populations at risk, risk factors, control actions): The Arizona Agricultural Health Promotion System (AAHPS) addresses the total agricultural sector. However, available information suggests that the Hispanic farm worker may be at a greater health and accident risk. Language problems and scarcity of Spanish safety training materials are possible causes of the perceived problem. The AAHPS is addressing the situation by identifying available materials and/or developing bilingual training materials. A bilingual FTE is being added to our program to enhance safety training for this particular audience.

Evaluability Assessment

Evaluation methods for our program include:

1. Pre/post testing of agricultural education students.
2. Comparison of year-to-year Model Safety program accident/injury records.
3. Conducting opinion surveys at the conclusion of safety training programs.

California (CA-1)

Project Title: Nurses Using Rural Sentinel Event

Project Director: Linda Rudolph, M.D.

Institution, Address:
California Public Health Foundation
California Occupational Health Program
2151 Berkeley Way, Annex 11
Berkeley, CA 94704
Phone: 510-540-3141 **FAX:** 510-540-3472

Personnel and Skills: Linda Rudolph, physician; Carol Conroy, epidemiologist; Kory McFarland, nurse; Yolanda Cervantes, nurse; Dan Dobrinen, safety engineer; Don Will, data manager and computer programmer.

Problems (diseases, injuries, hazards) Addressed: Acute fatal and nonfatal injuries associated with agricultural machinery, equipment, and hazards related to agriculture. Also addressed are motor vehicle-related injuries which occur during farm worker travel to and from fields during harvest and other work-related activities.

Project Objective: Surveillance linked to worksite specific and community-based prevention by (1) developing a surveillance system for reporting agricultural-related injuries and deaths; (2) investigating selected cases; and (3) developing and disseminating recommendations for prevention of injuries in the agricultural workforce and community.

Executive Summary

A reporting network and surveillance system has been established in Fresno and Monterey counties. These counties were selected based on the number of agricultural workers, number of acres used for agricultural purposes, and number and rate of agriculture-related injuries. Currently, there are eight hospitals, the county medical examiner, and the district California OSHA office reporting injuries and deaths in Fresno county, and three hospitals, one ambulance service, the district California OSHA office, the coroner-sheriff, and one occupational health center reporting injuries and deaths in Monterey county. An in-house newspaper clipping service is also used to identify cases.

To date, there have been 38 cases in Fresno and 14 cases in Monterey county. However, this reflects only reports from the medical examiner and coroner received since July 1991 and nonfatal injuries being reported as different hospitals and other reporters have been incorporated into the surveillance system since July. Over 10 cases have been investigated by an interdisciplinary team and a report including prevention strategies is in draft stage for each investigation. These investigations have shown that the methodology developed through the NURSE project is useful to investigate agricultural injuries and develop prevention strategies. Currently, we are working with county agencies (such as the county health departments and through a variety of media including radio talk shows, public service announcements, newspapers, meetings, agricultural fairs and shows, etc.). The ultimate goal is to prevent work-related injuries to agricultural workers and others exposed to hazards associated with agriculture.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Agriculture-related injuries and deaths are reported through a surveillance system involving medical care providers in the community. Injuries and deaths reported include those occurring on a farm and those involving agricultural equipment or machinery, injuries related to commuting to and from fields, and injuries related to transporting agricultural equipment. This project is being conducted in collaboration with the CAHSPS cooperative agreement, conducted by the University of California at Davis and county agencies responsible for health and safety. Information obtained through the surveillance system and investigation of selected cases will be disseminated to the population at risk and to others working in the field of agricultural safety and health.

2. Research (etiology, methodology, control): Information on potential risk factors and hazards will be compared to that found in representative population-based surveys and with worker compensation data to determine the usefulness of this surveillance system in identifying potential risk factors and hazards within the targeted counties.

3. Intervention (populations at risk, risk factors, control actions): This surveillance project is very intervention-oriented and develops recommendations based on investigations which include education, enforcement, and engineering interventions for preventing agricultural injuries. The recommendations are targeted at both farmers and ranchers and at farm workers and farm families. Project staff are in close contact with local and state organizations including the Farm Bureau and other agricultural associations, rural clinics, workers' compensation carriers, and AGSAFE (a coalition for safety in agriculture) to facilitate dissemination of data.

Evaluability Assessment

A dissemination plan is currently being developed and will include methods to evaluate the impact of dissemination of recommendations; emphasis will be given to information transfer rather than skills training. We will also try to evaluate the impact on the farmers/ranchers as well as the farm workers and family members. We are evaluating the validity of reporting by comparing cases with those identified through worker compensation data and other data systems.

California (CA-2)

Project Title: Center for Agricultural Disease and Injury Research, Education, and Disease and Injury Prevention

Project Director: Marc B. Schenker, M.D., M.P.H.

Institution, Address:
UC Agricultural Health & Safety Center at Davis
ITEH Bldg., Old Davis Rd.
University of California
Davis, CA 95616-8757
Phone: 916-752-4050 **FAX:** 916-752-5047

Personnel and Skills: James J. Beaumont, Ph.D., M.S.P.H., epidemiology; Mona Ellerbrock, M.P.H., continuing education specialist; Ellen Gold, Ph.D., epidemiology; James Grieshop, Ph.D., community education specialist; Robert Lawson, M.S.P.H., certified industrial hygienist, certified safety professional; Stephen A. McCurdy, M.D., M.P.H., occupational medicine, epidemiology; Patrick J. Marer, Ph.D., entomology, pesticide training coordinator; James Meyers, Ed.D., M.P.H., agricultural and health education; John Miles, Ph.D., agricultural engineering; Michael O'Malley, M.D., M.P.H., medicine, epidemiology; Dennis Pendleton, Ph.D., continuing education specialist; James Robinson, Ph.D., public health policy; Margaret Rucker, Ph.D., textiles and clothing; Steven Samuels, Ph.D., biostatistics; Jim Sanborn, Ph.D., toxicologist; Marc B. Schenker, M.D., M.P.H., medicine, epidemiology; James Seiber, Ph.D., chemistry, environmental toxicology; Robert Spear, Ph.D., environmental health science; William Steinke, Ph.D., agricultural engineering; Don Villarejo, Ph.D., rural sociology studies; Barry Wilson, Ph.D., avian sciences, environmental toxicology; Garen Wintemute, M.D., M.P.H., medicine, injury epidemiology.

Problems (diseases, injuries, hazards) Addressed:

1. The following problems were addressed:
   a. Health and safety problems among California farm families.
   b. Occupational health among California farm workers.
   c. Pesticide exposure in the agricultural workplace.
   d. Identification of risk factors for pesticide illness in agriculture.
   e. Tool modification (redesigning ladders and picking bags) to decrease injuries related to falls and sprains and reduce back injuries.
   f. Allergic contact dermatitis among California nursery workers.
   g. Contact, retention, and transfer of pesticides in clothing and other textiles.
   h. Acute or repetitive trauma injuries among California farm workers.
   i. Child farm fatalities in California.

2. Other issues addressed were:
   a. Presenting agricultural safety information to non-English speaking workers and their families.
   b. How to establish a comprehensive, written injury prevention program for agricultural operations.
   c. Safety training for farm labor contractors.
   d. A cross-sectional health survey of all persons whose occupation is or has been "farm employee."
   e. Continuing medical education focusing on the health effects of agricultural pesticides.

Program Objective: To improve the health and safety of people working in agriculture by establishing agricultural health and safety as a recognized discipline in occupational health.

Executive Summary

The UC Agricultural Health and Safety Center at Davis brings together components of several major, existing, relevant UC Davis programs into one functioning Center that addresses health and safety issues in western agriculture (Region 9). These programs include the Center for Occupational & Environmental Health, UCD University Extension, the UC Cooperative Extension Service, and the UC Statewide Integrated Pest Management (IPM) Project. The Center also includes collaboration of epidemiologists and clinicians from the Departments of Agricultural Engineering and Environmental Health Sciences, and educational specialists from Cooperative Extension, UCD University Extension, the UC Statewide IPM Project, and other programs. Close collaboration exists with the state Departments of Health Services, Food and Agriculture, and California EPA. The Pesticide Farm Safety Center provides expertise to the outreach and research activities, and the NIEHS Superfund Program based at UC Davis provides expertise in research on biologic markers of pesticide exposure. The USDA IR-4 Laboratory at UC Davis provides resources in analytic chemistry for exposure assays. Through collaboration with departments and organizations both within and outside of UC, the Center is able to provide leadership in addressing a broad variety of important issues in agricultural health and safety.

Four components exist within the UC Agricultural Health and Safety Center at Davis: **research, outreach, industrial hygiene/safety,** and **policy.** The **research** component initially is composed of seven separate projects, and the **outreach** component has six projects. The Center has a newly appointed industrial hygienist who is assisting with various health and safety programs as well as performing exposure assessments and other appropriate **industrial hygiene** activities. The **policy** component is designed to address agricultural health and safety from a legislative/regulatory perspective. Extensive interactions are underway for investigators within the research and outreach components, and among all four components. In addition, interaction and collaboration with investigators at NIOSH are developing on many of the research projects. Overlap of faculty also exists between the research and outreach components, which facilitates the desired interactions.

Research Overview: The research component of the Center has begun work on all of the projects described in the initial proposal during the past year, and substantial progress has been made on all of them. Some projects predated support from the Center, and are further along than those that began with the Center. The Center's research program focuses on projects such as reduced injury through tool design, development of an improved understanding of allergic contact dermatitis, evaluation of the prevalence and severity of acute and chronic illnesses among farmers and farm workers, and improvement of the understanding of pesticide illness and improved detection of exposure.

Two investigations will begin to address the spectrum and magnitude of health and safety problems among California farmers and farm workers. No similar studies have ever been done among western agriculture workers, and such an investigation is critical to characterize the health and safety issues needing further attention in this population. The large differences in agriculture practices, conditions, and workers means that hazards observed in other parts of the country cannot simply be assumed to be the same among western farmers and farm workers in the western states.

The first of these studies will assess the prevalence of health and safety problems among a representative cross-section of California farmers and farm managers. This study will also establish a cohort that can be followed up for determination of incident health problems, as well as be utilized for focused case-control studies. This is a telephone interview conducted through the California Department of Food and Agriculture using its registry of over 50,000 farmers in the state.

The second study has been created since the funding of the Center, based on the recognition of the critical need to do valid studies of health among Hispanic farm workers. The Center investigators with epidemiologic expertise in studying agricultural health will collaborate with Dr. Villarejo and collaborators who have field research experience working with Hispanic populations, for this population-based cross-sectional investigation of acute and chronic health problems among Hispanic farm workers.

Outreach Overview: The outreach component complements and enhances the Center's research efforts by disseminating the findings via Continuing Medical Education (CME) courses, worksite education, the development of worker safety training programs for farmers, farm labor contractors, and others, and through investigating new ways to effectively disseminate information. The outreach component also identifies current health problems and concerns for possible investigation by the research component investigators. During this past year, the Center's CME program sponsored workshops on preventing pesticide illnesses in California, Arizona, Texas, and Hawaii. University Extension held a series of courses designed to instruct management on complying with the new Senate Bill 198 which requires businesses to establish an injury prevention standard in the agricultural workplace.

The Center's multifaceted approach is designed to facilitate the identification and effective use of all channels of communication available, with both employers and employees benefitting from the information. Thus far, this very active outreach program has involved several areas of the state: efforts have predominantly been focused in the region from Sacramento south to Bakersfield. In addition, a survey of farm labor contractors involved the Imperial Valley and Ventura and Santa Barbara counties, as well as the areas of Blythe and Palo Verde.

Outreach programs are designed to use the experience and expertise from the initial projects to expand to new audiences, topics, and regions of the country in later years. The Center plans to host a conference during Year 3 for outreach and extension workers from the region and those from other regions who are interested in our areas of expertise (i.e., Spanish language programs, pesticide safety training working with labor contractors, and CME classes). This conference will bring together the body of information gathered and begin the process of transferring it to a larger group to serve as agents of change and multiply our efforts into even larger degrees of success in reducing agricultural injuries and illnesses.

Policy Component: The policy component of the Center focuses on addressing agricultural health and safety issues from a regulatory/legislative perspective. The program will analyze policy options for improving the health and safety of workers employed in agriculture. This component of the Center is an augmentation of the original proposal and only recently received funding approval.

Prevention Activities

We recognize that for prevention activities to have any reasonable prospect for success, input must be sought from all affected groups during all stages of the effort, from development to implementation. Accordingly we have solidified linkages to a large number of important organizations. Within the University these include the Departments of Environmental Toxicology, Applied Behavioral Science, and Integrated Pest Management, University Extension, UC Berkeley's School of Public Health, and the Division of Textiles and Clothing. Outside the University, we are working with the California

Department of Food and Agriculture, the California Environmental Protection Agency, and the AGSAFE coalition, which includes, but is not limited to, representatives of the California Institute for Rural Studies, California Farm Bureau Federation, Agricultural Producers, California Department of Health Services, Zenith Insurance Company, and the California Hispanic Health Care Association.

In order to maintain and expand these linkages, we have instituted a series of weekly seminars covering topics of interest to persons involved in agricultural health issues. In addition, we publish a regular newsletter highlighting the Center's activities.

1. Surveillance: The UC Davis Center does not maintain an active program of surveillance using statewide data bases. However, many Center projects use these data bases to critically review health problems in agriculture. For example, California Pesticide Illness reports and Pesticide Use reports are reviewed for risk factors related to pesticide illnesses. Similarly, the state workers compensation data base is used for analyzing statewide injuries in agriculture. Finally, the outreach component of the Center, with its active involvement in Cooperative Extension throughout the state, serves as an active surveillance system for the Center. Health and safety problems noted by extension agents and other outreach personnel are brought back to the Center for possible research or outreach initiatives.

2. Research: The research components of the Agricultural Health and Safety Center are generally directed toward identifying and characterizing important health outcomes, developing surveillance tools, and developing intervention strategies. The first of these research projects (R-1) is a cross-sectional study to characterize the health status of California farm families. This is a telephone survey of California farmers will focus on important health outcomes, including respiratory disease, dermatologic disease, traumatic injuries, and stress. The survey will yield prevalence information and help to identify risk factors for these various outcomes. A similar study (R-1 and O-5) is currently under development among California farm workers. We have identified a community in Fresno County to conduct a population-based, cross-sectional health survey among Hispanic farm workers. We are also conducting a study of the epidemiology of agricultural pesticide illness in California (R-3). The project utilizes the pesticide use reports submitted by growers and commercial applicators to evaluate risk factors such as demographic characteristics and pesticide application data to identify risk factors for pesticide illness.

A project by Dr. Barry Wilson (R-2) aims to develop more sensitive ways to detect exposure to organophosphate pesticides in the agricultural workplace. This project is studying the utility of various methods of exposure assessment, including field testing of cholinesterase levels.

Dr. John Miles (R-4) is studying ways to improve health and safety of field workers through tool design. He has improved designs for tools such as ladders and fruit carrying equipment in order to reduce work-related injuries in harvest workers.

A project by Dr. Michael O'Malley (R-5) is designed to evaluate risk factors for contact dermatitis among California nursery workers. The study will identify causes of dermatitis and risk factors that may be amenable to intervention.

Dr. Margaret Rucker (R-6) is involved in a project to study the contact, retention, and transfer of pesticides in clothing and other textile products. Improved understanding of these factors may lead to improved personal protective equipment for farm workers.

Dr. James Beaumont (R-7) is conducting a study of injuries among farm workers. The study utilizes Workers' Compensation claim data to be supplemented with onsite industrial hygiene assessments. Dr. Schenker is also conducting a study of child farm fatalities in California, using death certificates provided by the Health Data and Statistics branch of the California Department of Health Services. The distribution of childhood fatalities in California will be compared to comparable studies done elsewhere in the U.S. where agricultural practices and farm demographics are different.

3. Intervention: Dr. John Miles' study of tool modifications to improve health and safety of field workers (R-4) represents an intervention (through provision of redesigned tools) that may lead to reduced injuries. Other interventions are primarily educational. For example, the outreach projects are designed to provide information and education training to appropriate persons regarding health and safety issues. These educational interventions include project O-1, *Safety and Hazard Awareness Training for Agricultural Workers*. Project O-2 was directed toward establishing a health and safety program for the agricultural workplace in accordance with SB 198 requirements. The course was offered at six locations throughout California in April and May and taught participants how to identify and evaluate workplace hazards, correct unsafe or unhealthy conditions, and conduct worker safety training and address each of these elements in a written format. In addition, a study is underway by Dr. Donald Villarejo (R-1 and O-5) to evaluate the possibilities of safety training among farm labor contractors, a group which is attaining increasing importance in the farm labor market. Finally, we are offering a series of Continuing Medical Education forums for agricultural professionals and medical practitioners, public health practitioners, and health and safety regulatory professionals (O-6). Classes originally taught in California, Arizona, and Hawaii will expand to other western states in the future. Topics include medical toxicology, pesticide uses as associated with major crops within a region, emergency medical practices for pesticide poisoning, diagnoses and work histories, dermatitis associated with agricultural employment, cancer, and neurological, respiratory, and other chronic health hazards of the agricultural environment.

Evaluability Assessment

With regard to dissemination activities, criteria for determining effectiveness are built on the principle of ultimately linking dissemination activities with the Center's prevention activities. In order to create linkages, several states of development will be activated:

1. Develop the individual outreach-dissemination projects.
2. Create linkages between and among projects in order to better impact audiences.
3. Create coherent outreach program to impact individual audiences at multiple levels of change.

Target audiences include farm workers and farm owners/managers; rural health personnel and through them, farm workers; industry personnel including insurance representatives, local government representatives, grower groups, other trainers, etc.; and labor contractors and through them, farm workers. For the audiences targeted for dissemination of health and safety training materials (i.e., farm workers and farm owners/managers and clinics), outcomes are perceived to be related to knowledge (both awareness and understanding), attitudes (beliefs and opinions), skills (what they do and do not do), and actions for self-direction. For industry and labor contractor audiences, emphasis will be placed on knowledge (e.g., understanding of needs and requirements), attitudes (belief structures related to needs and approaches), skills (e.g., the ways they may respond to providing support and training), and, most significantly, action in which industry representatives assume greater responsibilities for developing and testing dissemination materials and strategies.

Overall, outcomes are to be linked with prevention activities for both the Center and for those carried out in an interdependent manner by the audiences themselves. That is, a goal of dissemination is to create structures and mechanisms which can carry on without or with a minimum of maintenance by the Center.

Attachment to CA-2
UC Agricultural and Health Safety Center at Davis
Funded Research, Outreach, Industrial Hygiene, and Policy Components (1991-92)

Research

R1. Health Status of California Farm Families. The objective of this study is to identify important health and safety problems among California Farm families. The information gained will be helpful in supporting future research on improving health conditions of farm families. A survey will be conducted of a representative sample of California Farm Bureau members. The subjects will complete a questionnaire on agricultural exposures, personal habits, and acute and chronic health problems, including hearing loss, respiratory conditions, dermatitis, mental health and stress-related disorders, traumatic injury, musculoskeletal conditions, and reproductive outcomes. Specific health and safety problems identified in the survey will be the target of subsequent case-control investigations, including onsite industrial hygiene evaluations. Principal investigator: **Marc Schenker**, M.D., M.P.H., Associate Professor of Medicine, Division of Occupational and Environmental Medicine, School of Medicine, UCD.

Occupational Health Among California Farm Workers. The pilot phase of this study is currently in the development phase. This project was not in the original proposal, but was undertaken because of the size and importance of the farm worker population, particularly in western agriculture. Two proposals for NIOSH funding were submitted by November 1, 1991. The pilot phase of this project is supported by Agriculture Health Center funding. Farm workers provide the majority of the labor in agriculture, particularly western agriculture, and hence are at greatest risk for adverse occupational health outcomes attributable to farm work. In California and other major agricultural regions of the United States, the majority of farm workers are Hispanic, an ethnic minority group that has been historically neglected with respect to occupational health research due to social, cultural, and language barriers, as well as by a lack of scientific emphasis in the area. Epidemiological methods are being used in characterizing important exposures and health outcomes among California farm workers by conducting a cross-sectional health and work survey. The study consists of two phases. In the initial pilot phase, a cross-sectional health survey will be conducted among approximately 400 persons in a single predominantly Hispanic agricultural community. The pilot will allow for the refining of methods for population enumeration, sampling, and data collection, and determine prevalence estimates for specified exposures and occupational health outcomes. Principal investigator: **Marc Schenker**, M.D., M.P.H., Associate Professor of Medicine, Division of Occupational and Environmental Medicine, School of Medicine, UCD.

R2. Detection of Exposure by Workers to Agricultural Chemicals. The purpose of this research is to develop more sensitive ways to detect exposure to pesticides in the agricultural workplace. It will pave the way for future studies on pesticide exposure and will aid in the development of improved pesticide application equipment, techniques, and protective devices to reduce worker exposure. Principal investigator: **Barry Wilson**, Ph.D., Professor of Environmental Toxicology/Avian Sciences, Departments of Environmental Toxicology/Avian Sciences, UCD.

R3. Epidemiology of Agricultural Pesticide Illness in California. This study will use California's extensive data sources on pesticide use and illnesses to identify risk factors for pesticide illness in agriculture. The information can be used by state agencies, researchers, and extension specialists to target and implement measures for safer pesticide use. A decrease in pesticide-related illnesses is expected. Sources of data to be used include physician's reports of suspected or actual pesticide illnesses, and Pesticide Use reports submitted by growers and commercial applicators. Risk factors to be analyzed include the combination of individual characteristics (e.g., age, race), application data (e.g., type of application, crop, season), and pesticide use data (e.g., pounds applied per acre). Principal investigator: **Marc Schenker**, M.D., M.P.H., Associate Professor of Medicine, Division of Occupational and Environmental Medicine, School of Medicine, UCD.

R4. Tool Modifications to Improve the Health and Safety of Field Workers. This project will focus primarily on redesigning ladders and picking bags used by workers who harvest citrus trees. Improved designs should decrease injuries related to falls and sprains, reduce the number of back injuries, lower the cost for Workers Compensation insurance premiums, and eliminate the need to carry heavy bags of fruit, thus enabling more people to be employed as harvest workers. Principal investigator: **John Miles**, Ph.D., Associate Professor of Agricultural Engineering, Department of Agricultural Engineering, UCD.

R5. Allergic Contact Dermatitis Among California Nursery Workers. Workers Compensation claims show that nursery workers are at high risk for occupational skin disease from exposure to allergenic plants and agricultural chemicals. This study will identify specifically the causes of dermatitis among nursery workers so that employers and workers can better manage exposure and target measures to reduce the problem. A network of five regionally located dermatologists will use patch testing and other diagnostic tools to test cases of dermatitis in nursery workers employed by cooperating growers. Principal investigator: **Michael O'Malley**, M.D., M.P.H., Associate Medical Coordinator, Worker Health and Safety Branch, California Department of Food and Agriculture, and volunteer clinical faculty, Department of Internal Medicine, School of Medicine, UCD.

R6. Contact, Retention, and Transfer of Pesticides in Clothing and Other Textile Products. The purpose of this study is to evaluate the roles of apparel and home fabrics in secondary contamination of the farm home. Investigating the factors affecting pesticide contact and transfer could lead to recommendations on the handling of contaminated apparel, reentry intervals, and the selection of carpets and fabrics used in farm homes. The ability of carpet to absorb and release pesticides is being studied since the floor represents one of the largest potential deposition sites for residues. Families with young children may have special cause for concern because children are apt to play on the floor and are less able to tolerate a given level of exposure. Analysis will be performed using questionnaires and field and laboratory work. Principal investigator: **Margaret Rucker**, Ph.D., Associate Professor of Textiles and Clothing and Chair, Department of Textiles and Clothing, UCD.

R7. Epidemiologic Study of Farm Worker Injuries. Seventy-five percent of all California farm worker injuries result from acute or repetitive trauma. The objective of this study is to improve understanding of farm worker injuries and promote effective interventions. Analysis of serious and complicated injuries will be performed using Workers Compensation claims and the results of a survey on the health status of California farm families (research project R1). Traumatic injuries among farmers will be compared to uninjured controls and evaluated for specific risk factors. Evaluation will include onsite industrial hygiene assessments. Principal investigator: **James Beaumont**, Ph.D., Associate Professor, Department of Internal Medicine, School of Medicine, UCD.

Child Farm Fatalities in California. The purpose of this study is to analyze the epidemiology of fatalities occurring among children ages 0-14 on California farms. Child farm fatalities (ICD-9, E-Codes 850-929) for the years 1960 to 1989 will be analyzed using tapes of death certificates provided by the Health Data and Statistics Branch of the California Department of Health Services. Data are currently being analyzed for 1980-89. Proportional mortality for farm-related accidental deaths will be derived compared to nonfarm-related deaths. Coroners' reports for all deaths and a sample of nonfarm accidental deaths will be requested and analyzed. The distribution of childhood fatalities in California will also be compared to comparable studies done elsewhere in the United States, where agricultural practices and farm demographics are different. Principal investigator: **James Beaumont**, Ph.D., Associate Professor, Department of Internal Medicine, School of Medicine, UCD.

Outreach

O1. Safety and Hazard Awareness Training for Agricultural Workers. Methods of presenting agricultural safety information to non-English speaking workers and their families will be evaluated. In the process, training and resource materials will be developed for employers, health care and social service providers, and others who have close contact with agricultural workers and their families. An annual Regional Health and Safety Conference will be established to serve as a forum for employers, workers, insurance carriers, educational institutions, health care providers, regulatory agencies, and the public to exchange information relating to agricultural health and safety. Coordinators: **Patrick Marer**, Ph.D., Pesticide Training Coordinator, UC Statewide Integrated Pest Management Project, UCD; and **James Grieshop**, Ph.D., Specialist/Lecturer in Community Education, Department of Applied Behavioral Sciences, UCD.

O2. Establishing a Health and Safety Program for the Agricultural Workplace. New legal requirements in California state that as of July 1, 1991, every employer must have a comprehensive, written, injury protection program. This project developed a half-day course to help farm managers and supervisors prepare a well-documented, effective safety program for their operation. The course was offered in six locations throughout California in April and May. It taught participants how to identify and evaluate workplace hazards, correct unsafe or unhealthy conditions, conduct worker safety training, and address each of these elements in a written plan. Coordinators: **Dennis Pendleton**, Ph.D., Continuing Education Specialist and Unit Director, University Extension, UCD; and **Mona Ellerbrock**, M.P.H., Continuing Education Specialist, University Extension, UCD.

O4. Information Exchange and Interaction on Agricultural Health Issues. The goal of this project is to bring together the diverse interests involved in agricultural safety and rural health by establishing a coalition that will provide for improved dissemination of information, improved collaborative effort to prevent agricultural injury and illness, and improved public awareness and support for prevention activities. Development of this multi-interest coalition known as AGSAFE is under way. AGSAFE is intended to be an independent, self-sustaining organization reflecting the full range of organizations and interests involved in health and safety issues in California agriculture and rural communities. Currently, AGSAFE participation includes state agriculture and health agencies, farm worker clinics, insurers, agricultural industry groups, and community and nonprofit organizations. Publications and forums will be employed to disseminate research information, effective intervention methods and materials, and other information relevant to the reduction of agricultural illness and injury. Coordinator: **James Meyers**, Ed.D., M.P.H., Extension Specialist, School of Public Health, UC Berkeley.

O5. Safety Training for Farm Labor Contractors (FLC). Survey interviews of labor contractors have shown that most employees of labor contractors have little, if any, instruction in safety practices. In addition, it has been found that the overwhelming majority of such employees never see or speak directly with the labor contractor. Instead, they are supervised by "major domos" who are also the persons who do the recruitment and hiring. The plan is to develop a written narrative of observations of the potential for safety training in different crop regions of the state. Also at least one focus group meeting will be held with *major domos* in the San Joaquin Valley to elicit their views on the kind of information that would be most useful for them. In this context, the updating of lists of labor contractors and *major domos* will continue, to keep abreast of all changes. The data base includes records for approximately 3,800 FLC businesses. Finally, a feasibility study will be developed for the outreach and safety training aspect of the Ag Health and Safety Center effort. This will be developed in conjunction with the staff of the Ag Health and Safety Center, and with an IPM Program specialist. Coordinator: **Donald Villarejo**, Ph.D., Executive Director, California Institute for Rural Studies and Research Associate, Department of Sociology, UCD.

Cross-sectional Survey of Farm Worker Health Status. This project will cooperate with Dr. Marc Schenker in conducting a cross-sectional survey of farm worker health status. Employment-based surveys are inherently biased toward persons currently holding farm jobs and exclude both those who are unable to find work and those who have left the work force. It has long been recognized that the very young average age of farm employees in California (35 years) is a direct reflection of the absence of older workers, an unknown fraction of whom may have been forced into early retirement due to injury. A cross-sectional survey offers the opportunity to determine the health status of all persons whose occupation is or has been "farm employee," irrespective of current employment status. Little is known about the reasons for the absence of older workers. It may be possible to learn more about this factor as well. The plan is to utilize Census of Population data to identify San Joaquin Valley communities with a high proportion of current farm employees. A method developed by the Colorado Department of Health that essentially enumerates all households within a given geographic area and then samples among those households will be used. Obviously, the strategy seeks to include labor camps and motels as well as traditional households. Coordinator: **Donald Villarejo**, Ph.D., Executive Director, California Institute for Rural Studies and Research Associate, Department of Sociology, UCD.

O6. Continuing Medical Education. Medical education programs, focusing on the health effects of agricultural pesticides, will be developed and presented to health and agricultural professionals such as medical practitioners, public health practitioners, and health and safety regulatory professionals. The classes will be conducted throughout California, Hawaii, and Arizona during the first two years, and will expand to other western states afterward. Topics will include: medical toxicology; pesticide uses associated with major crops within a region; emergency medical practices for pesticide poisoning; diagnoses and work histories; dermatitis associated with agricultural employment; cancer; neurological, respiratory, and other chronic health hazards; clinical assessment of common pesticides; working with farm workers and farmers; contamination of soil, groundwater, and food residues; pesticide regulations; and risk management. Coordinator: **Marc Schenker**, Ph.D., M.P.H., Associate Professor, Department of Internal Medicine, School of Medicine, UCD.

Industrial Hygiene Component. The industrial hygiene component of the Center consists of one industrial hygienist, who was hired in August 1991. The purpose of this component is threefold: to participate in research; to participate in outreach projects; and to establish the infrastructure for an ongoing industrial hygiene component in Ag Center activities.

Policy Component. This program will analyze policy options for improving the health and safety of workers employed in agriculture. Administratively located within the University of California's Center for Occupational and Environmental Health (COEH) in Berkeley, the project will complement the other components of the center at UC Davis. The Agricultural Health Policy Program will address agricultural health and safety from a regulatory/legislative perspective. The primary research emphasis will be on policy concerning occupational exposures, but will also cover environmental regulations and the search for nonpesticidal alternatives. Part of that research effort will include the characterization of the agricultural industry, labor force, and pesticide use and regulation in

California. The program will access the available resources of the Davis Center and the COEH and bring together university-based researchers, legislative staff, and organizational representatives to analyze policy options for improving health and safety in the agriculture industry.

California (CA-3)

Project Title: California Agricultural Health and Safety Promotion System

Project Director: William E. Steinke, Ph.D.

Institution, Address:
University of California
Agricultural Engineering Extension
Davis, CA 95616
Phone: 916-752-1613 **FAX:** 916-752-2640

Personnel and Skills: William E. Steinke, Ph.D., Extension Agricultural Engineer and Farm Safety Director; Patrick J. Marer, Ph.D., State Pesticide Training Coordinator; James M. Meyers, Ph.D., Extension Specialist, School of Public Health, U. C. Berkeley; James I. Grieshop, Ph.D., Extension Community Development Specialist; Salvador Santillan, Program Representative, materials development; Martha Stiles, Research Associate, educational campaign development and evaluation.

Problems (diseases, injuries, hazards) Addressed: Tractor safety, understanding pesticide labels, pesticide signal words, machinery safety, proper lifting techniques, first aid for pesticide poisoning, field sanitation, laundry procedures.

Project Objective: Reduction of injuries and illnesses among those who live and work on California's farms and ranches through education and worksite safety improvement.

Executive Summary

Agriculture in California is incredibly diverse, complex, and dynamic. Over 250 crops are produced commercially by a total workforce estimated to be in the range of from 600,000 persons to in excess of 1.35 million over the course of a typical year. Approximately 30,000,000 acres of California are devoted to agriculture in six major growing areas. Of the 58 counties in California, five have a value of agricultural production in excess of $1 billion annually. California produces virtually 100% of the total U.S. production of several commodities such as Brussels sprouts and almonds.

The components of CAHSPS include: (1) a campus-based responsibility for developing program packets on occupational safety, occupational health, and pesticide application safety to be used for cooperative extension and other outreach efforts; (2) cooperative efforts with the California Occupational Health Program in the California State Department of Health Services, local health departments, and other health agencies in order to improve the access to accurate and current health and safety information among farmers, farm families, farm workers, and farm worker families; (3) collection and analysis of injury and illness data from various sources; (4) collaboration with faculty and those responsible for continuing education in order to promote enhanced and expanded health and safety topics into new and existing agricultural courses; (5) a rigorous planning and evaluation component which focuses on behavior modification as the measure of program success; and (6) active participation of community groups as partners in program planning, development, and delivery.

Materials for onsite worker training have been produced and tested with several members of a grower panel coordinated by a farm advisor cooperator. Based upon feedback from the grower panel, training materials are being developed on the general concepts of employee safety training and the use of audio-visual and handouts for successful training. It has also been documented that California farmers and ranchers' major source of safety and health information and training is their workers' compensation insurance carrier. Currently, efforts are underway to produce comprehensive documents on specific agricultural hazards that could be distributed by workers' compensation carriers. We are working with the insurance companies to produce references that they will accept for distribution to their clients, thus taking advantage of established channels and trusted sources of information.

Baseline data has also been collected regarding the "Locus of Control" that individuals feel with respect to their health and safety while working or living on a farm. We participated in two farm shows this winter, promoting safety in agriculture and collected several hundred questionnaires, the results of which are still being analyzed.

Prevention Activities

1. Surveillance: Data were collected in cooperation with the Agricultural Statistics Branch of the State Department of Food and Agriculture and the USDA. This survey was mailed to 2000 farms and ranches in California last year and resulted in a 52% response rate. The data are still being analyzed, although preliminary results indicate that 14% of all operations reported injuries on the job with an average of 3.2 incidents on those farms and ranches that reported one or more work-related injury. This data will be compared to results obtained by the State Department of Health Services in their analysis of workers' compensation data and the FFHHS. Program priorities will be determined based upon these sources.

2. Research: None.

3. Intervention: The population at risk has been identified as those exposed to hazards while living or working on California farms and ranches. This is a bi-modal population, with one segment dominated by young Hispanic men with limited English skills and the other segment consisting primarily of relatively older Caucasian men. Farm owners and operators must complete safety training on their operations for all specific hazards, so this state requirement is being used as leverage to introduce the safety training materials being developed by this project. At the same time, checklists are being prepared and likely locations for hazards are being suggested as part of the trainer preparation for the sessions. It is hoped that worksite hazards will be reduced through this technique.

Evaluability Assessment

Test audiences are being surveyed to determine the training materials' effectiveness at delivering the intended message in a fashion that is retained by those in attendance. Results are used to revise training packets and add additional topics needed for successful safety training.

Attitudes of the farm community have also been gathered regarding their feeling of control over the safety and health of their workplace environment or operation. Promotional programs are now operating in the areas where the initial surveys were completed. One year from the date of the original survey, we will again survey the community and determine whether they feel an increased sense of control and if hazards on the farm have been reduced by their taking positive actions to exercise that control and make the workplace safer. It is anticipated that differences will be seen due to the different promotional campaigns being conducted in and around the target counties.

Colorado (CO-1)

Project Title: Colorado Farm Family Health and Hazard Surveillance

Project Director: Lorann Stallones, Ph.D.

Institution, Address:
Colorado State University Department of Environmental Health
Fort Collins, CO 80523
Phone: 303-491-6156 **FAX:** 303-491-1815

Personnel and Skills: L. Stallones, epidemiology; J. Reif, epidemiology; K. Blehm, industrial hygiene; J. Tessari, toxicology; H. Ramadell, toxicology; T. Keefe, biostatistics; J. Nuckols, agricultural engineering; A. Tucker, pulmonary physiology; R. Ackley, audiology; C. Garrett, sociology; M. Leff, research.

Problems (diseases, injuries, hazards) Addressed: Injuries, hearing loss, respiratory diseases, mental health, musculoskeletal conditions, pesticide exposure, noise and vibration, behavioral risk factors, other standard industrial hygiene hazards (wiring, falls, etc.).

Project Objective: To conduct statewide survey of 500 farms followed over four years to assess prevalence and incidence of selected medical conditions and assess changing behavioral risk factor patterns. In an eight-county area to conduct in-person interviews on 500 farms to determine prevalence of selected medical conditions and behavioral risk factors, to conduct onsite safety and hazard appraisals using industrial hygiene inspections, to obtain measurements of hearing loss and respiratory problems, and on a subset of farms, to conduct pesticide exposure assessments.

Executive Summary

The statewide survey will be conducted to represent all Colorado farms. The eight-county area sample includes Larimer, Weld, Logan, Sedgwick, Phillips, Yuma, Washington, and Morgan counties.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Four year surveillance of problems listed above is the aim of the Colorado Statewide Telephone Survey to be conducted by personnel at the Colorado Department of Health under the direction of Carol Garrett. Dr. William Marine from University of Colorado Health Sciences Center provides data from a Rural Occupational Injury Surveillance relevant to agricultural injuries to the project director.

2. Research (etiology, methodology, control): See description under Executive Summary, above. Data collected will be compared with other surveys or studies of the general population and other farming populations.

3. Intervention (populations at risk, risk factors, control actions): Survey data and results will be used to design appropriate intervention activities.

Evaluability Assessment

Evaluations look at representativeness of the sample, and quality/utility of data for designing interventions. Dissemination will be judged by its timeliness/appropriateness to the target audience.

Colorado (CO-2)

Project Title: High Plains - Intermountain Center for Agricultural Health and Safety

Project Director: Roy M. Buchan, Dr.P.H.

Institution, Address:
Colorado State University
110 Veterinary Science Building
Fort Collins, CO 80523
Phone: 303-491-6151 **FAX:** 303-491-7778

Personnel and Skills: R.M. Buchan, principal investigator; P.D. Ayers, ROPS research, H.S. Ramsdell, CO/Altitude; B.P. Beaudion, team leader; V.V. Buchan, team leader; D.R. Sandfort, team leader; B.W. Sheafor, directing needs assessment undertaken by Center; R.F. Grundemann, safety consultant; C.O. Neidt, providing design assistance to project directors; T.J. Keefe, biostatistician; M.W. Little, industrial hygienist; M.J. Selby, secretary; N.O. Whitehead, staff assistant; L.S. Schmiesing, GRA; I.A. Al-Azzawe, GRA; M.L. Beard, BRA; R.D. Fockler, GRA; C.A. Thomas, student.

Problems (diseases, injuries, hazards) Addressed: Factors, conditions, needs, and desires that affect health and safety in agriculture.

Project Objective: The Center operated a three-dimensional program involving research, education and training, and prevention. All program dimensions are devoted to health (elimination or reduction of acute and chronic disease) and safety (prevention of injury and death). The Center is actively assessing the region's current knowledge and remediation efforts related to agricultural health and safety, coordinating with existing research/education/ prevention programs, and stimulating the development of new programs when needed. In a sense, the Center is fitting together the jigsaw puzzle of agricultural health and safety programs in the region and replacing any missing pieces.

Executive Summary

Colorado State University is a land grant institution with a history of research, education, and service in agriculture since 1872. The university's Institute of Rural Environmental Health (IREH) has, to a degree, served the occupational health and safety needs of agriculture since 1973. The High Plains - Intermountain Center for Agricultural Health and Safety (HI-CAHS) was established in September, 1991, to continue the health and safety efforts of the Institute and the University in agriculture.

The Center programs address the region's agricultural occupational health and safety needs through an already-established network of farmers, ranchers, agribusiness, Cooperative Extension, farm organizations, etc. Center activities are currently focused in Colorado and as programs are demonstrated to be successful in improving health and safety, liaison will be developed with other states in the region where the successful programs can be adapted to the unique conditions in those states. An organizational and operational team has been created and includes the Institute of Rural Environmental Health, Department of Education, Department of Social Work, Human Factors Research Laboratory, Department of Environmental Health, Department of Education, Department of Social Work, Human Factors Research Laboratory, Department of Environmental Health, Cooperative Extension Service, Department of Agricultural and Chemical Engineering and the Greeley Foundation Medical Clinic. Other key groups are represented on an established advisory committee to help form and direct Center activities.

Prevention Activities

1. *Surveillance:* Recognizing that agriculture is one of the most hazardous occupations, Center personnel are conducting onsite hazard evaluations at agribusinesses throughout Colorado. Extensive record-keeping of identified hazards will result in a data base from which considerable information will be available. The Center is receiving fatality investigation reports from the Colorado Department of Health which will help determine where Center resources should be distributed. A referral arrangement has been established with the NIOSH funded Farm Family Hazard Survey Program in Colorado through which findings of this program will be referred to the Center on an as-needed basis for follow-up assistance to the individual farmer.

2. *Research:* The following three research projects are currently underway:
   a. Rollover Protective Structures (ROPS) for Pre-ROPS Tractors.
   b. Wheat Harvest Grain Dust Exposures
   c. Carboxyhemoglobin Levels in Agricultural Workers: Interaction of Carbon Monoxide and Elevation

3. *Intervention:* Activities conducted by the Center include onsite services and a variety of training and education services and activities.

Evaluability Assessment

The evaluation component of the Center is being developed to determine the effectiveness of research intervention strategies, training and education activities, and delivery methods conducted by the Center. In addition, many other activities are planned.

Colorado (CO-3)

Project Title: Promoting Agricultural Safety and Health in Colorado

Project Director: Paul D. Ayers, Ph.D.

Institution, Address:
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Fort Collins, CO 80523
Phone: 303-491-6172 **FAX**: 303-491-7369

Personnel and Skills: Paul D. Ayers, Associate Professor, Extension Agricultural Engineer and Colorado Farm Safety Specialist; Mac Legault, Farm Safety Coordinator and previous Vocational Agriculture Instructor.

Problems (diseases, injuries, hazards) Addressed: Agricultural machinery, animal and chemical hazards.

Project Objective: Decrease the number of agricultural fatalities, injuries, and health problems in Colorado by increasing Cooperative Extension activities in agricultural safety and health.

Executive Summary

Increased activities in agricultural safety and health by Colorado Cooperative Extension have resulted in the following: (1) over 50 new videotapes used to distribute agricultural safety and health information; (2) distribution of over 800 safety gloves at farmers meetings; (3) distribution of an agricultural safety and health newsletter; (4) development and distribution of an agricultural safety and health resource notebook; and (5) over 10,000 contacts at agricultural meetings with an agricultural safety and health display, with over 2,000 safety decals distributed.

Prevention Activities

1. Surveillance: Agriculture death certificate information is being obtained with cooperation of the state Department of Health. Agricultural accident newspaper clippings are being collected. A survey of Colorado tractor safety features has been conducted through Cooperative Extension agents.

2. Research: None.

3. Intervention: Farm family intervention programs have been implemented in the form of children's farm safety day camp, farm family safety nights, agricultural worker meeting presentations, media releases, material distribution and agricultural safety and health displays.

Evaluability Assessment

Program evaluation is being conducted through HI-CAHS, the Agricultural Health and Safety Center at Colorado State University.

Florida (FL-1)

Project Title: Florida's Agricultural Health Promotion System

Project Director: William J. Becker, Ph.D.

Institution, Address:
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, FL 32611
Phone: 904-392-2468 **FAX:** 904-392-2468

Personnel and Skills: William J. Becker, extension safety specialist, professor; Pierce H. Jones, CD-ROM, professor, agricultural engineering; Jeffrey S. Nelson, CD-ROM, assistant in extension; JoAnn Hilliker, CD-ROM, assistant in extension; Linda Isaacs, graduate assistant, video programs; Steve Kozak, video production.

Problems Addressed: This program is designed to address the injuries and illnesses suffered by agricultural workers in Florida as identified by the Division of Workers Compensation, by providing employers, extension personnel, health workers, and others interested in occupational health and safety in agriculture with information and programs to enable them to strengthen their health and safety programs.

Project Objective: It is the intent of this program to address the three objectives of the Agricultural Health Promotion System:

1. Identify and disseminate prevention information to agricultural workers on occupational hazards associated with injuries and illnesses.

2. Promote the consideration of safety and health issues into the management of agricultural operations for the purpose of reducing agricultural work-related injuries and illnesses.

3. Introduce and improve control components into continuing education and agricultural curricula by drawing injury prevention and health promotion topics into new and existing courses.

Executive Summary

Initial efforts have been made to establish a committee to consider the incorporation of more health and safety into the undergraduate curriculum. An in-service training program is in the planning stages for three locations across the state in August 1992. County extension personnel, agribusiness safety personnel, and county health and safety personnel will be the participants.

The CD-ROM of agricultural health and safety laws, rules, regulations, and best management practices is under development. Approximately 30 items are already on a disk that is in distribution.

Five video instructional programs are in development. All five scripts have been written. Video-taping is nearly complete for four of them. These programs will be in both English and Spanish.

Prevention Activities

1. Surveillance: An Analysis of Agricultural Accidents in Florida -- 1990 has been completed. This is the 10th annual such analysis that has been conducted in cooperation with the Division of Workers Compensation. Other sources of problem recognition are the county extension service offices and the major agribusiness associations.

2. Research: The above referenced analysis has been the major research conducted to identify the agricultural health and safety problems of the state.

3. Intervention: Intervention is attempted by developing and disseminating safety and health educational programs, publications, newsletters, and news releases that are directed at the populations at risk and the risk factors identified.

Evaluability Assessment

No formal evaluation has yet been conducted. However, demand for programs, publications, and newsletters continues to increase. The number of work-related serious injuries and deaths to agricultural workers shows a slow but steady decline over the years.

Georgia (GA-1)

Project Title: Georgia Healthy Farmers Project

Project Director: Barbara Browne

Institution, Address:
Georgia Division of Public Health
Georgia Healthy Farmers Project
878 Peachtree Street, N.E., Room 100
Atlanta, GA 30309-9844
Phone: 404-894-4283 **FAX:** 404-894-9242

Personnel and Skills: Wade Sellers, M.D., principal investigator; Barbara Browne, B.A., project director; Judy Hartley, coordinating R.N.; Pat Colson, R.N.; Nancy Fussell, R.N.

Problems (diseases, injuries hazards) Addressed: Agricultural occupational injuries.

Project Objective: To assess types and causes of injuries through surveillance and offer appropriate interventions to prevent recurrence of some injuries.

Executive Summary

The project covers six south Georgia counties that depend heavily on agriculture. GHFP currently has 186 farm injury records with approximately 27% of the injuries occurring to farm children. (Injuries occurring between August 1, 1991 and July 31, 1992).

Prevention Activities

1. Surveillance: (problem recognition, diagnostic criteria, reporting, linkage to response): Nurses collect data from physicians' offices, emergency rooms, medical records, news media, coroner's offices, and sheriff's departments. The data was entered in Epi-Info and analyzed. Analysis shared with doctors, hospitals, extensions, and communities.

2. Research (etiology, methodology, control).

3. Intervention (populations at risk, risk factors, control actions): Farm safety education classes for adults and school age farm children who live and work in a farming environment where multiple risk factors are present. Farm Safety Day Camp was developed and offered in 1992. A more comprehensive camp is being planned for 1993. Nurses address 4-H and Vocational Agriculture classes in schools.

Evaluability Assessment

Farm Safety Day Camp has already received strong community support and involvement. Student evaluations are positive but must follow population for a longer period of time to determine effectiveness.

Iowa (IA-1)

Project Title: Cooperative Agreement for Occupational and Safety Surveillance through Health Departments and Nurses in Agricultural Communities

Project Director: Russell W. Currier, D.V.M., V.P.H.

Institution, Address:
Iowa Department of Public Health
Lucas State Office Bldg.
Des Moines, IA 50319-0075
Phone: 515-281-5643 **FAX:** 515-242-6284

Personnel and Skills: Kris McIntee, B.S.N., R.N.; Wendy E. Kuhse, B.S., R.N.; Peggy Clarahan, B.A., R.N.; Carol A. Trimble, B.S., secretary.

Problems (diseases, injuries, hazards) Addressed: Agricultural-related injury hazards, respiratory disease, noise-induced hearing deficit, and occupational stress.

Project Objective: Conduct community assessment of agricultural-related occupational exposures and health-related hazards in four regions in Iowa to create a data base for local analysis and technical assistance to communities for intervention planning and implementation. Appropriate cases for HHE are referred to NIOSH.

Executive Summary

Iowa has 105,000 farm families who are exposed daily to occupational hazards which result in a death rate to farmers from injury of four times the overall occupational death rate (in 1991, 40.9 per 100,000 Iowa farmers vs. approximately 10-11 per 100,000 all occupational). Farm children, farm wives, employees, visitors, and farm service workers are also killed while working, but not included in the occupational death rate, making the problem even greater. Injury morbidity is just becoming available by region, allowing more cost effective planning for preventive interventions. Since 1980, farmers in Iowa have ranked first in suicide mortality for various occupational groups; specific rate is three and one-half times overall Iowa rate. (The Iowa suicide rate and national rate closely parallel each other at between 10-11 per 100,000 population. Iowa farmer suicides are consistently between 40 and 50 annually.) In addition, chronic respiratory, hearing, and musculoskeletal health problems result from occupational exposures. The development of preventive initiatives are critical to the health of this group. The Occupational Nurses in Agricultural Communities (OHNAC) serve as consultants and collaborate with community groups and coalitions which are forming to address their local agricultural health problems. This project is very early (12 months) into their activities and they have formed some strong alliances in that time with the University of Iowa Institute of Occupational Medicine, Iowa State University Extension Services, disability prevention projects, Center for Rural Health, Iowa Agricultural Health and Safety Service Program (IA-HASSP), Iowa Center for Agricultural Safety and Health, vocational agriculture programs, school nurses, 4-H groups, and hospitals concerned about agricultural health.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Each nurse is conducting active injury surveillance in a "sentinel" county and works with Sentinel Project Researching Agricultural Injury Notification Systems (SPRAINS) to maintain a state-wide system of injury morbidity and mortality data. The active counties are studied to obtain data on both frequency of injury and population denominator information for rate calculations. Also more complete data are assured with active surveillance.

2. *Research (etiology, methodology, control):* Research is only relevant to this project in that the nurses may provide stimulus for research through discussion with NIOSH and Iowa universities. They are also involved with direct research projects data collection (injury follow-up, form distribution, and collection in local areas (for the Tractor Abatement Project and for the Children and Farm Safety Survey (in conjunction with daycare research in Marshall and Hardin counties in Iowa).

3. *Intervention (populations at risk, risk factors, control actions):* Data from SPRAINS is being used to target populations for specific occupational injury preventive interventions on the farm. Wendy Kuhse has been working with staff from the Institute for Occupational Medicine in a tractor injury abatement project for two northeast Iowa counties identified through SPRAINS as the counties with highest tractor mortality rates. Each nurse has made educational presentations to farm wives groups, school age children, 4-H groups, and school nurses. These presentations are made to provide an awareness of Iowa's farm health problems and to stimulate an interest in and motivate behavior change within the exposed group. Lifestyle change must come from within the exposed group and the continuation of the OHNAC project is critical to the fundamental motivation needed for behavior change in the farm population in Iowa. OHNAC nurses have served as catalysts in a number of local community projects such as health fairs, safety day camps, farm safety walk-abouts, and training of vocational agricultural students (who then teach younger classes).

Evaluability Assessment

Pre- and post-tests have been used for presentations to school aged children showing change of knowledge occurring with these groups. Projects are targeted toward high risk groups and geographical areas. Sentinel counties were chosen with intention to obtain more complete data and population information in those particular counties with high frequency of injury and disease morbidity and mortality. The most important outcome will be a significant drop in injury and disease mortality among this population in Iowa.

Iowa (IA-2)

Project Title: Agricultural Health Promotion Systems

Project Director: August Ralston

Institution, Address:
Iowa State University
1085 Elm Hall
Ames, IA 50111
Phone: 515-294-4127 **FAX:** 515-294-0918

Personnel and Skills: Iowa State Faculty: Beno, occupational safety; Hanna, equipment safety; Lorenz, statistician and sociologist; Mayer, air quality; Normen, mental health; Normen, mental health; Power, risk management; Ralson, risk management; Schwab, safety specialist; Stone, clothing contamination; Wintersteen, pesticide applicator training. Assistants: Miller, communications; Oodman, research; Stetten, agricultural education.

Problems (diseases, injuries, hazards) Addressed: Broad safety and health promotion program has been developed that includes tractor rollovers, machinery and equipment safety, farmstead hazards, safe use of pesticides, air quality/confinement, stress, farm youth, and managing safety.

Project Objective: Regarding agricultural occupational safety and health: (1) advance capability of Iowa State University Extension to educate and intervene, (2) improve networking within Iowa, (3) establish cooperative relationship with NIOSH research centers, (4) improve course content, and (5) promote safety and health for farm workers and families.

Executive Summary

Most of the efforts at Iowa State under the AHPS cooperative agreement fall within two major parts of the plan of action. One part emphasizes training and education to increase the ability of professionals to respond to agricultural occupational safety and health needs. This includes the development of eight different instructional guides on relevant topics, training and networking within Extension, and creation of two data bases for research and educational programs. The second part of the plan of action is the promotion of safety and health through a coordinated campaign that involves the distribution of monthly fact sheets, weekly radio announcements and programs, exhibits, and demonstrations. The intent is for the promotion to encourage farm workers and families to take steps to improve safety and health and to seek further education and assistance from the Extension professionals who are the focus of the first part of the plan of action. The preparation and distribution of materials and the promotional effort are continuing and on-track; impacts will begin to be known in the latter part of 1992.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): The SPRAINS data generated in Iowa, information gathered through a press clippings service, and the views of Extension field staff are used to guide the emphases in the educational and promotional effort under the AHPS cooperative agreement. The Iowa SPRAINS project, directed by the Iowa Department of Public Health, is funded by NIOSH.

2. Research (etiology, methodology, control): Using appropriate sampling techniques, 513 farm operators have been surveyed to establish a baseline of knowledge, attitude, and behavior regarding farm safety and health in Iowa. These operators will be resurveyed in the fall of 1992 to evaluate whether or not the educational and promotional effort described in the Executive Summary above is having an impact. On-site hazard analysis will also be a part of the research.

3. Intervention (populations at risk, risk factors, control actions): The program at Iowa State is a broad one that represents an attempt to reach out to the farm population in Iowa. The topical emphases are identified in the Problems section above. The program is a truly comprehensive educational and promotional effort. A cooperative relationship is underway with Oklahoma State University in the development of the data bases and for producing selected educational materials.

Evaluability Assessment

The primary evaluative approach is described above under the Research section. In addition, the distribution of the instructional guides and fact sheets, the airing of the radio announcements and programs, and the educational and intervention activities of the Extension field staff in the farm safety and health area are being/will be tracked or monitored and evaluated in terms of quantity and impact.

Iowa (IA-3)

Project Title: Cancer Control Project for Iowa Farmers

Project Director: Roscoe Morton, M.D.

Institution, Address:
Mercy University Hospital Foundation
Sixth & University
Des Moines, IA 50314
Phone: 515-247-3248 **FAX:** 515-243-5633

Personnel and Skills: Three clinicians, one statistician, one epidemiologist.

Problems (diseases, injuries, hazards) Addressed: Breast cancer, cervical cancer, prostate cancer, melanoma.

Project Objectives: Early detection of cancer.

Executive Summary

Mercy's project includes the following components: (1) a barriers survey comparing 263 farmers with 263 nonfarmers in a 35 county area; (2) a cancer screening program targeted at breast, cervical, and prostate cancers and melanoma; (3) a community education program for cancer control; and (4) a program to improve the cancer control practices of physicians.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Mercy plans a population survey of Iowa farmers to assess barriers preventing farmers from utilizing effective cancer control services and routine medical care; 263 farmers and 263 nonfarmers will be randomly selected to participate in a questionnaire survey using the BRFSS.

2. *Research (etiology, methodology, control):* The program for improving cancer control among physicians will compare an intervention group with a control group.

3. *Intervention (populations at risk, risk factors, control actions):* The primary intervention is the cancer screening program.

Evaluability Assessment

Process and outcome evaluation and education and screening programs will be conducted through focus groups and "exit" questionnaires.

Iowa (IA-4)

Project Title: Center for Agricultural Disease and Injury Research, Education, and Prevention

Project Director: James A. Merchant, M.D., Dr. P.H.

Institution, Address:
The University of Iowa
Department of Preventive Medicine
Institute of Agricultural Medicine and Occupational Health
124 AMRF, Oakdale Campus
Iowa City, IA 52242
Phone: 319-335-4190 **FAX:** 319-335-4225

Personnel and Skills: Multidisciplinary team functioning in an integrated fashion, consisting of physicians (including occupational and pulmonary medicine), a veterinarian, industrial hygienists, environmental chemist and engineer, biostatisticians, health educators, and an epidemiologist.

Problems (diseases, injuries, hazards) Addressed: Agricultural respiratory diseases, especially agricultural organic dust hazards; injuries from tractors; prospective study of farm family health; livestock confinement building exposures; dairy farm health hazards; and agricultural chemical exposure assessment.

Project Objectives: The goals of this Center include: developing a comprehensive agricultural health and safety research program; developing and evaluating novel disease and injury prevention programs and strategies; and developing and implementing training of health professionals.

Executive Summary

The Center includes five cores -- Administrative, Training and Education, Biometry, Industrial Hygiene, and Laboratory. The Center's research projects include: experimental exposures to grain dust; studies of airway disease in grain handlers; assessment of respiratory disease among dairy farmers; studies of agricultural chemical applicators; and epidemiological assessment of farmers (Keckuk County Rural Health Study). The Center involves collaboration with the Marshfield Medical Research Foundation, Marshfield, WI. The Center is designed to support and collaborate with other NIOSH-funded research projects in Iowa -- Cancer Surveillance/Education (Mercy Hospital in Des Moines); Farm Health and Safety Promotion, (Iowa State University in Ames); and the Farm Family Health and Hazard Surveillance Project (University of Iowa in Iowa City).

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* CADIREP communicates through the Iowa Center for Agricultural Safety and Health (I-CASH) with Iowa State University and the Iowa Departments of Public Health and Agriculture and Land Stewardship. The Health Department has an ongoing active hospital and provider surveillance of farm illnesses and injuries. The Center links with two other Institute projects, the developing rural injury surveillance system and the NIOSH-sponsored farm family survey.

2. *Research (etiology, methodology, control):* Research on projects mentioned above includes the tools of environmental surveillance/assessment, clinical screening, epidemiology, and behavioral change.

3. *Intervention (populations at risk, risk factors, control actions):* Four community intervention projects are a part of CADIREP, including respiratory hazards of swine and also poultry confinement, tractor injuries, and childhood injuries.

Project Title: Iowa Farm Family Health and Hazard Surveillance Project

Project Director: William Popendorf, Ph.D.

Institution, Address:
The University of Iowa
Department of Preventive Medicine and Environmental Health
Institute of Agricultural Medicine and Occupational Health
134 AMRF
Iowa City, IA 52242
Phone: 319-335-4213 **FAX:** 319-335-4225

Personnel and Skills: William Popendorf, Ph.D., CIH; Craig Zwerling, M.D., Ph.D.

Problems (diseases, injuries, hazards) Addressed: This project comes about as a response to the concern that farmers and their families experience a disproportionate share of disease and injury due to their association with the chemical, biological, physical, ergonomic, and psychological hazards of farming. The dilemma of agriculture as an industry and a way of life is partly responsible for its lag behind industry in the application of the traditional preventive phases of recognition, evaluation, and control of health and safety hazards.

Project Objectives: To determine: the distribution of work history, farming practices related to risk factors, medical symptoms, and the nature and circumstances of traumatic injuries; basic medical parameters on a subcohort of farming families via a short medical screening exam; the environmental, biomechanical/ergonomic factors related to farm machinery buildings, and work methods likely to contribute to the occurrence of work-related injuries or illnesses on this subcohort; and, levels of environmental exposure to a small number of selected low-frequency, high-hazard agents or processes likely to contribute to work-related illnesses.

Executive Summary

The project data collection has not yet begun; therefore, there are no results to report.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Iowa has developed an extensive questionnaire using many questions from standardized, nationally known survey instruments. NIOSH suggested the use of many of these questions so that where possible, Iowa farmers can be compared to this national survey data.

2. *Research (etiology, methodology, control):* This survey of Iowa farmers will consist of a mailed questionnaire with telephone follow-up and is designed to collect information about work history, farm practices, medical symptoms, and the nature of traumatic injuries. In a smaller subcohort, there will be a medical examination of farm families and a hazard survey on the farm. Hazard assessment of a small number of farms for hazards that are low-frequency but high-hazard will also be conducted.

3. *Intervention (populations at risk, risk factors, control actions):* Surveys will provide data for targeting interventions effectively to the Iowa farm population.

Evaluability Assessment

Dissemination will be evaluated by its frequency, timeliness, and usefulness to the agricultural extension, agricultural health, and farm communities.

Kansas (KS-1)

Project Title: Agriculture Safety and Health Promotion System for Older Kansas

Project Directors: John A. Kramer, Michael Bradshaw, Earl Baugher

Institution, Address:
237 Seaton Hall
Kansas State University
Manhattan, KS 66506
Phone: 913-353-5813 **FAX:** 913-532-6944

Personnel and Skills: John A. Kramer, Co-Project Director; Earl Baugher, Co-Project Director; Michael Bradshaw, Co-Project Director; Marvin Hachmeister, Project Leader; Michael Dennis, Media Specialist; Kerri Ebert, Media Specialist.

Problems (diseases, injuries, hazards) Addressed: Injuries and fatalities occurring as the result of exposure to agriculture hazards. In Kansas, over half of agricultural fatalities involve farm tractors or machinery.

Project Objective: Increased safety and health awareness among Kansas farm families, especially those 60 years of age and older.

Executive Summary

Currently in its second year, the project's focus is organizing county level volunteer agricultural safety and health teams. These teams are to deliver 5 to 10 minute safety messages at agricultural meetings with their county. Teams have been organized and trained in nearly all the 44 counties in eastern Kansas, with the balance of the state covered during fiscal year 1993. To support these teams, eight farm safety tabloids and four 5-minute video tapes are being developed. A statewide medical campaign is being undertaken. Other activities include formalizing agricultural safety in KSU Agricultural Engineering courses, a collegiate agricultural safety design contest, and collecting agricultural fatality data.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Collecting baseline agricultural fatality data utilizing newspaper clipping service and death certificate data.

2. *Research (etiology, methodology, control):*

3. *Intervention (populations at risk, risk factors, control actions):* Providing information to the farming population working with the Kansas Farm Bureau, area Agency on Aging, and the Western Association (membership includes implement and hardware dealers in Kansas and part of Missouri).

Evaluability Assessment

Program participants will receive a post test two to three months following an educational contact. This will survey safety and health practices to determine if behavior has been altered.

Project Title: Traumatic Farm Injury Surveillance in Kentucky

Project Director: Carl W. Spurlock, Ph.D.

Institution, Address:
Kentucky Department for Health Services
275 East Main Street
Frankfort, KY 40621
Phone: 502-564-3418 **FAX:** 502-564-6533

Personnel and Skills: C. Spurlock, Ph.D., epidemiologist; M. Auslander, D.V.M., M.S.P.H., Medical Epidemiologist; B. Boylan, R.N., M.S., Community Health Nurse; V. Brandt, R.N., Community Health Nurse; J. Muehlbauer, R.N., Community Health Nurse.

Problems (diseases, injuries, hazards) Addressed: All injuries to farmers or farm family members, or others injured on a farm, that require medical care.

Project Objective: To identify the types and numbers of farming-related injuries, with special emphasis on three sentinel injury events, and use these data as the basis for designing appropriate prevention strategies.

Executive Summary

More than 90 percent of Kentucky's 91,000 farms are not required to comply with OSHA injury reporting regulations. To help estimate farming-related injuries, with special emphasis on three sentinel injury events, and use these data as the basis for designing appropriate prevention strategies.

Prevention Activities

1. Surveillance: The local community health nurses will receive analysis of local injuries from the epidemiologists; any indication of specific problem areas can become the basis for educational efforts at the local community level. The local community health nurses work out of the local health districts which provide a direct link to individuals, health care providers, and farm-oriented groups, e.g. homemakers clubs, 4-H, Farm Bureau, that can be targeted for educational efforts by the nurse.

2. Research: Surveillance of injuries requiring medical care by a systematic reporting system for the hospitals, physicians, dentists, and chiropractors. The Farm Family Health and Hazard Surveillance project at the University of Kentucky will be utilized as a source of controls for our case studies.

3. Intervention: Safety promotion and prevention techniques through education of individuals and groups will be utilized. Additional efforts will be made to promote farm safety through a regular use of local mass media, i.e., television, radio, newspapers, health care newsletters.

Evaluability Assessment

The length of the time remaining for the study (4+ years) will allow for the observation of any downward trends in the number of farm injuries as surveillance continues and local farm safety promotion efforts become regularly scheduled.

Project Title: Kentucky Farm Family Surveillance

Project Director: Robert McKnight, Sc.D.

Institution, Address:
Department of Preventive Medicine
Room MS129X, College of Medicine
University of Kentucky
Lexington, KY 40536-0084
Phone: 606-233-6836 **FAX:** 606-258-1038

Personnel and Skills: R. McKnight, epidemiologist; A. Frank, Physician; S. Horstman, industrial hygiene; L. Piercy, agricultural safety, and others.

Problems (diseases, injuries, hazards) Addressed: A wide variety of injuries, diseases, environmental hazards, and behavioral risk factors will be assessed.

Project Objectives: To use active epidemiologic surveillance to describe occupational hazards and health status within four subgroups of the Kentucky farm population.

Executive Summary

A series of telephone, face-to-face, and on-the-farm surveys will yield statewide estimates of health/hazard status in four Kentucky groups: (1) male farmers age 55 and older; (2) female farmers age 18 and older; (3) children age 17 and under who live or work on farms; (4) male farmers are surveyed by the telephone (n=1200 each). Additionally, 350 male farmers age 55 and over receive an on-farm physical examination and industrial hygiene survey of the farm.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Kentucky FFHHS has developed strong linkages with the "Nurses in Agriculture" project of the Kentucky Department of Health Services. Consultation has been received in surveillance methods and questionnaires construction from the individuals at the University of Minnesota School of Public Health and at Johns Hopkins University. The majority of survey questions and procedures have been derived, in part, from publications and standardized questions used by the National Center for Health Statistics, U.S. Department of Agriculture (Census of Agriculture), and U.S. Department of Labor (Current Population Survey).

2. *Research (etiology, methodology, control):* Distributions of hazards and health effects will be compared across each subgroup and with the general U.S. population as relevant.

3. *Intervention (populations at risk, risk factors, control actions):* Survey will provide data for targeting interventions effectively to each subgroup studied.

Evaluability Assessment

Dissemination will be evaluated by the frequency and timeliness of publications and reports, as well as targeting of findings to appropriate agencies, health providers, and Kentucky's farm population.

Maine (ME-1)

Project Title: Occupational Health Nurses in Agricultural Communities - Maine (Maine Agricultural Safety and Health Program)

Project Director: Stephen C. Shannon, D.O., M.P.H.

Institution, Address:
Maine Bureau of Health
Department of Human Services
State House Station #11
Augusta, ME 04333
Phone: 207-289-5378 **FAX:** 207-287-4172

Personnel and Skills: Joyce Roy, R.N., occupational surveillance nurse; Sue Riva, R.N., occupational surveillance nurse; Norma Stacey-Scott, R.N. occupational surveillance nurse; Rhonda Webber, B.S., planning and research associate; Stephen C. Shannon, D.O., M.P.H., medical epidemiologist.

Problems (diseases, injuries, hazards) Addressed: All disease, injury, and occupational hazard data will be examined for agricultural workers.

Project Objective: Institute surveillance for occupationally-related injuries and illnesses among agricultural workers for the purpose of education and prevention.

Executive Summary

The Maine Agricultural Safety and Health Program (MASHP) was established to target occupational conditions among agricultural regions. Potatoes, blueberries, broccoli, dairy, apples, and beef are the principal crops, with wood production at least a part-time component of many farming operations. At least 7000 mostly owner-operated farms exist in Maine, with about 40,000 farmers and full or temporary farm workers. MASHP is initially targeting surveillance activities at: pesticide poisoning, noise-induced hearing loss, occupational respiratory conditions, and injuries. In order to institute surveillance activities among the agricultural community, contacts have been instituted with the medical care providers, case reports have been solicited, and pilot injury surveillance protocols have been designed and are being instituted. We are exploring the use of other medical and non-medical data bases to obtain surveillance information. Continuing education programs have been held and are being organized in the targeted areas, and a newsletter has been established which targets the medical community. Hearing screening programs have been held at agricultural community functions. Initial results indicate that a majority of agricultural workers tested may be suffering from noise-induced hearing loss. Injury case surveillance has been hampered by lack of health department authority to access medical records without patient consent. While changes in statutory authority are sought, composite anonymous data are being collected and suggest that significant trauma is experienced by agricultural workers, especially around harvest time.

Prevention Activities

1. Surveillance: MASHP works closely with other institutions to establish sources of surveillance data and develop linkages with the health care and agricultural community, including: targeted regional hospitals, health care clinics, and physicians; University of Maine Cooperative Extension Service; Maine Bureau of Labor Standards; Poison Control Center, Rural Health Care Coalition; Maine Ambulatory Care Coalition; Maine Lung Association; Acadia Health Education Coalition; Central Maine Technical College; family practice residency programs; Bingham Consortium for Health Research; Blueberry Farmers Association; Potato Growers Association; Maine Dairy Farmers

Association; North Woods Safety Foundation; and Pine Tree Legal Foundation. In addition other data sources within state government are used, including Chronic Disease Program, Cancer Registry, Vital Statistics, and Epidemiology. The Maine Occupational Health program has an established cooperative agreement with the Maine Department of Labor for the provision of consultative services in warranted cases.

2. *Research:* A pilot project of hearing screening for noise-induced hearing loss in agricultural workers is underway to evaluate the relationship between exposure and occurrence in this population. Initial findings will be used to develop a protocol to more exactly document the occurrence of this condition and the relationship to exposure. A hearing-protection behavior modification program will be developed and tested using the lessons of the pilot project.

3. *Intervention:* Surveillance data will be used to provide education to agricultural and medical communities about the level of adverse conditions and hazardous exposures. Prevention programs will be formulated in response to surveillance data as outlined for hearing screening above. Appropriate referrals for follow-up will be made to other institutions and agencies when warranted.

Evaluability Assessment

Evaluation of programs will be performed as interventions are developed. Both evaluation questionnaires, and pre- and post-testing will be done for continuing education programs. Surveys of target audiences will be performed to evaluate risk-reduction behavior modification, e.g., wearing protective hearing devices.

Michigan (MI-1)

Project Title: Michigan Agricultural Health Promotion

Project Director: Howard J. Doss

Institution, Address:
Michigan State University
223 A.W. Farrell Hall
Agricultural Engineering
East Lansing, MI 48824-1323
Phone: 517-353-3737 **FAX:** 517-353-8982

Personnel and Skills: Howard Doss, safety specialist; Kenneth Rosenman, M.D., occupational health specialist; Bob Wilkinson, Ph.D., P.E., agricultural engineering; Gary Bond, Ph.D., toxicologist; Bill McCloud, media specialist; and Larry Olson, Ph.D., pesticide safety/toxicology.

Problems (diseases, injuries, hazards) addressed: All agricultural safety and health problems.

Project Objective: Promote safety work practices on the farm and improve physician recognition of agricultural-related health issues.

Executive Summary

This project covers the state of Michigan. Results to date include the development of "safe work" guides on machinery operator safety and machine guarding. Rollover protection systems for agricultural tractors, electrical hazards, confined space hazards, grain handling hazards, slip and fall protection, manual materials handling techniques, livestock handling and livestock confinement safety; a newsletter to the 3,000 physicians in the state; an 800 hot line for extension agents and physicians to respond to inquiries on agricultural health and safety issues. We are also planning an annual report on agricultural injuries and illnesses in Michigan.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting linkage to response):* We are using death certificates and hospital discharge data to conduct surveillance for agricultural-related fatalities and lung disease.

2. *Research (etiology, methodology, control):* Not applicable.

3. *Intervention (populations at risk, risk factors, control actions):* An outreach education to farmers, extension agents, and health care providers is being conducted.

Evaluability Assessment

Logging the calls received on the 800 hot line is occurring. We plan to conduct post card surveys to evaluate the response to our educational material.

Michigan (MI-2)

Project Title: Michigan State University Farm Cancer Project

Project Director: Kenneth Rosenman, M.D.

Institution, Address:
Michigan State University
B100 Clinical Center
East Lansing, MI 48824-1313
Phone: 517-353-1846 **FAX:** 517-336-1326

Personnel and Skills: Kenneth Rosenman, M.D., physician/epidemiologist; Joseph Gardiner, Ph.D., statistician; Patricia Mullan, Ph.D., evaluator; Blake Smith, Ph.D., educator; Marie Swanson, Ph.D., cancer epidemiologist; Talmage Holmes, Ph.D., epidemiologist; Andrew Hogan, Ph.D., health economist; Henry Barry, M.D., family practitioner; William Given, Ph.D., sociologist; Howard Doss, M.S., extension safety specialist.

Problems (diseases, injuries, hazards) Addressed: Cancer among farmers and their families, specifically early detection for breast, lip, and skin cancer.

Project Objective: To evaluate the barriers to farmers and their families for obtaining early detection screening for cancer, and then intervene to implement intervention strategies to overcome the barriers.

Executive Summary

Three counties in Michigan in which agriculture predominates have been chosen to assess the barriers to farmers and their families obtaining screening for skin, lip, and breast cancer. Intervention strategies using personal contact, mass media, and local organizations both public and private will be implemented to encourage farmers and their families to obtain appropriate cancer screening. The project will be evaluated by comparison changes in the intervention counties with a control county.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting linkage to response):* State Cancer Registry data and epidemiologic studies have been used to identify cancers of concern.

2. *Research (etiology, methodology, control):* Evaluate the barriers to obtaining screening for cancer. Evaluate effectiveness of implementation strategies to overcome the barriers.

3. *Intervention (populations at risk, risk factors, control actions):* Farmers and their family members over the age of 40. Epidemiologic studies have shown increased skin and lip cancer among farmers. Mammographic usage per recommended guidelines is low in rural areas.

Evaluability Assessment

A control county will be compared to our intervention counties. Pre- and post-intervention questionnaires will be administered in both intervention and control counties.

Minnesota (MN-1)

Project Title: Occupational Health and Safety Surveillance Through Nurses in Agriculture (Minnesota Farming Health Project)

Project Director: Don Bishop, Ph.D., Principal Investigator

Institution, Address:
Minnesota Department of Health
717 SE Delaware Street
Minneapolis, MN 55440
Phone: 612-623-5613 **FAX:** 612-623-5775

Personnel and Skills: Don Bishop, PI and community intervention specialist; Catherine Lexau, project director, occupational public health nurse; Ronald French, epidemiologist and co-PI; Brenda Lenz, public health nurse; Susan Voehl, public health nurse; Colleen Nelson, public health nurse; Mark Kinde, epidemiologist and co-PI.

Problems (diseases, injuries, hazards) Addressed: Respiratory diseases, musculoskeletal disorders, hearing loss; all agriculture-related injuries.

Project Objective: Identify cases of farm-related disease and injury within three distinct geographic regions of Minnesota. Develop local coalitions to implement intervention strategies. Analyze farm survey data to identify specific risk factors and/or disease/injury problems.

Executive Summary

The Minnesota Farming Health Project, through three locally-based public health nurses overseen by a statewide project director, is intervening in northwestern, central, and southwestern Minnesota. An extensive farm survey, including spirometric and audiometric testing, is being completed by randomly selected farm families in these counties. Results include survey design, development and testing; functioning community coalitions to provide local ownership and leadership for the project; and, partnerships with community businesses and health care providers that have already yielded cases of farm-related disease and injury.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Farm survey, modelled after the RRIS and OATS, developed in concert with University of Minnesota and Marshfield Medical Centre. Also, case-finding mechanisms (via clinics, hospitals, grain elevators, and press clippings) have been developed.

2. *Research (etiology, methodology, control):* The survey methodology intends to identify survey respondents via plot maps and Agricultural Conservation Department lists. Because of geographic distances, some compromise was made in survey design; for example, all residents of a section will be invited to participate.

3. *Intervention (populations at risk, risk factors, control actions):* Interventions identified will target farmers and farm families. Program maintenance and sustenance will occur as a result of the local coalition ownership.

Evaluability Assessment

Principal intent of this program is to export the case-finding methodology and community coalition dynamics to other local public health agencies, as well as to other states. Appropriate evaluation measures are being discussed to document progress, objective accomplishment, and necessary change.

Minnesota (MN-2)

Project Title: Cancer Control in Farmers Study

Project Director: Jack Mandel, Ph.D.

Institution, Address:
University of Minnesota, School of Public Health
Box 807 Mayo, 420 Delaware Street, S.E.
Minneapolis, MN 55455
Phone: 612-626-0900 **FAX:** 612-626-4837

Personnel and Skills: Two Ph.D. epidemiologists, two Ph.D. statisticians, three research physicians, one study coordinator.

Problems (diseases, injuries, hazards) Addressed: Control of two cancers, breast cancer and skin cancer, and proper handling of pesticides will be addressed.

Project Objectives: To demonstrate that cost effective cancer prevention programs can be implemented in a high risk farming population that underutilizes existing cancer prevention strategies.

Executive Summary

This study will be conducted in four counties in southern Minnesota. The first phase of the study will include an assessment of the barriers to health care, access and utilization among farm populations, and an evaluation of the farming populations knowledge and risk factors, screening methods, and treatments for breast and skin cancer. Based on the results of the barriers and education assessment, one second phase of the study will be on intervention study to educate farm families on skin and breast cancer detection and prevention, and safe handling of pesticides.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* A cross-sectional telephone survey of 1500 adults living on farms in south-central Minnesota will be conducted to assess the barriers to health care access and utilization, and the level of knowledge of farm families about risk factors, screening methods, and treatments for breast and skin cancer.

2. *Research (etiology, methodology, control):* Research has been described in Surveillance and Intervention sections.

3. *Intervention (populations at risk, risk factors, control actions):* An education program will be given to 1200 adults and 300 children in two intervention counties, to increase knowledge about skin and breast cancer prevention, and the safe handling of pesticides.

Evaluability Assessment

Success of the intervention will be assessed in the post-intervention survey of participants in the intervention study. The survey will evaluate changes in knowledge and behavior after the intervention program.

Project Title: Cooperative Agricultural Promotions Agreement

Project Director: David Baker

Institution, Address:
University of Missouri-Columbia
Columbia, MO 65211
Phone: 314-882-2731 **FAX:** 314-882-1115

Personnel and Skills: Dave Baker, Associate Professor, M.S. project director; Rusty Lee, extension associate, M.S., coordination of daily activities and development of promotional and educational materials. Gelene Adkins, assistant professor nursing, Ph.D., assisting the statewide advisory committee in identifying and developing health education resource materials; she will also help conduct in-service training conferences for the county health nurses and Extension field staff. Brooke Ballenger, B.S., agricultural journalist is responsible for development of the resource material abstracts that comprise the resource infobase; she also writes press releases and promotional features and edits materials developed by other staff members.

Problems (diseases, injuries, hazards) Addressed: The high lost-time accident rate and high death rate of agriculture as compared to other industries.

Project Objective: Statistics show that Missouri farmers and farm workers do not place a high priority on agricultural safety and occupational health. The goal of this project is to raise their awareness of specific safety and health issues through the expansion of University of Missouri programs and technical assistance efforts.

Executive Summary

The activities of this cooperative agreement can best be observed by looking at the following specific objectives:

1. To develop and implement a statewide Farm Women's Extension Safety Program. The primary purpose of this program is to prepare farm women to safely and efficiently deal with farm operations that may be unfamiliar to them and that can present special hazards to them. The secondary purpose of the program is to help these women become effective in encouraging their spouses and children to develop a more positive approach to safety in their farming operations.

2. To develop and implement a computerized infobase of educational resources and service referrals related to agricultural safety and occupational health in Missouri. A wide variety of local, state, and national resources relevant to agricultural safety and occupational health currently exist. Unfortunately, individuals requiring information or assistance with a specific problem cannot always readily find the source or sources of the information needed.

3. To expand and focus the efforts of the extension service and county public health providers. This objective will be accomplished through the development of a comprehensive agricultural health promotion and technical assistance program at the local level.

4. To develop a comprehensive accident database so that future intervention strategies will be directed at the most prevalent causative factors of the accidents in Missouri agriculture.

5. To develop a course unit on agricultural safety and health for inclusion in the Agricultural Engineering Course AE310 - In-service course in Agricultural Mechanization.

Prevention Activities

1. Surveillance: Missouri Department of Health has provided accident data compiled from death certificates, indicating activities of the farming operation that individuals were engaged in when the accidents occurred.

2. Intervention:

a. Objective 1. A promotional pamphlet describing the need and purpose of seven workshops has been sent throughout the state. The workshops are offered on a county-wide basis, and the regional extension field staff are taking the lead in organizing these one-day events. A generic outline has been distributed to field staff to assist them in their planning. All attendees receive a Farm Women's Safety Resource Notebook, which includes the following: an order form for NRAES Publication 12, *First on the Scene*; all MU Safety and Health Guides that are currently available; a Farm Self-Assessment Checklist; and statistics on Missouri farm injuries and deaths. To date, four workshops have been held, with an attendance total of 99.

b. Objective 2. Through the use of a commercially available software program entitled "Folio," we are compiling resource listings containing the resource title, an abstract of the contents, the target audience, keywords, and availability information. "Folio" is an extremely user-friendly program that searches the entire listings for the keywords the user selects. The infobase currently contains 251 listings. The search is fully executable from a personal computer floppy disk (either 5.25 or 3.5 inch). It is our intention that extension centers located in every county in Missouri will have this infobase to assist them in their traditional role as providers of relevant information to the agricultural workforce. This year, the infobase will be distributed to the 13-county Central Missouri Extension Region for a pilot study.

c. Objective 3. We have organized a statewide Agricultural Advisory Committee, which is charged with developing a statewide comprehensive agricultural health education program. The committee is comprised of a diverse group of individuals in an effort to gain perspective from various angles. The committee has met twice thus far, with efforts focused on understanding its purpose and identifying and prioritizing the agricultural health issues within Missouri.

d. Objective 4. We are currently at a standstill as we wait for approval of our use of the NSC/NIOSH Accident/Injury Mail Survey in gathering the data.

e. Objective 5. A unit on agricultural safety and health for course AE310 is currently being developed.

Evaluability Assessment

The impact of the farm accident situation in Missouri cannot be evaluated at this time. However, to determine the effect of the Farm Women's Safety Seminars, we have asked each attendee to complete a questionnaire prior to start of each program. It is our intention to send the attendees a similar questionnaire in six months to a year. From a comparison of the responses to the two questionnaires, we will be able to determine whether a shift has occurred regarding the priority of safety on the farm.

Nebraska (NE-1)

Project Title: Harvest for a Lifetime

Project Director: Joleen TenHulzen Huneke

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State of Nebraska, Department of Health
301 Centennial Mall, P.O. Box 95007
Lincoln, NE 68509-5007
Phone: 412-471-2647 **FAX:** 412-471-0383

Personnel and Skills: One nurse, two health educators, one administrator, three biostatisticians, one secretary, and various consultants.

Problems (diseases, injuries, hazards) Addressed: Three groups of cancers: (1) hematopoietic & lymphatic, (2) skin and lip, (3) oral.

Project Objectives: To increase awareness of the risk factors and early warning signs of the cancers studied. Through behavior modification, reduce the incidence of these cancers.

Executive Summary

The focus of this project is to determine if there are differences in and reasons for differences in cancer prevention practices and use of preventive health services between farmers and urban residents in Nebraska. Based on this information, a community-wide health education effort will be implemented for the farmers. This study/demonstration project will occur in 18 counties in Eastern Nebraska.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Barriers to effective cancer control activities and access to health care will be elicited through a telephone survey conducted by the SRI Gallup Organization (Barriers Survey). A total of 1200 individuals will be sampled: 800 farmers and 400 urban Nebraskans. The sample of rural farmers will be chosen from rural resident directories using proportional sampling while the random sample of urban residents will be selected by random digit dialing.

2. *Research (etiology, methodology, control):* Research has been described in Surveillance and Intervention Sections.

3. *Intervention (populations at risk, risk factors, control actions):* The results of the barriers survey will serve as the basis for designing a community-wide health education effort for farmers. Interventions will target children and adults, as well as farmers and professionals who interact with farmers. The interventions will occur in 10 of the 18 counties receiving the barriers.

Evaluability Assessment

Success of the intervention will be assessed in a post-test survey in the 18 counties receiving the barriers survey. Knowledge and attitudes of 400 farmers in the 10 intervention counties will be compared with knowledge and attitudes of farmers in the 8 control counties and 3 urban areas.

New Jersey (NJ-1)

Project Title: Agricultural Health Promotion Systems for New Jersey

Project Director: Zane R. Helsel, Ph.D.

Institution, Address:
Rutgers Cooperative Extension - Administration
Martin Hall, Room 111, Cook Campus
P.0. 231
New Brunswick, NJ 08903
Phone: 908-932-9308 **FAX:** 908-932-6769

Personnel and Skills: W. Zhao, farm safety/surveillance; D. Fiola, infectious insects; G. Hamilton, pesticides; S. Thomasine, ATVs; R. Samulis, farm safety/pesticides; M. Vodak, forestry; S. Tweed & G. Flemlin, marine vessel safety; K. Malinowski, horses; W. Roberts, curriculum.

Problems (diseases, injuries, hazards) Addressed: Infectious insects, pesticides, fishing vessel safety, ATV safety, woodlot safety, livestock handling, on-farm health and safety reviews, migrant farm worker safety and health.

Project Objective: The health and safety of New Jersey agricultural workers will be improved through educational programs unique to its diverse agriculture (i.e., horticultural crops, horses, infectious insects, migrant workers, marine, etc.).

Executive Summary

Educational programs taking place in various parts of New Jersey include: (1) on-farm safety and health reviews; (2) ATV safety courses (hands-on and audio visual); (3) development of a model horse safety farm and video; (4) pesticide training for migrant farm workers (Hispanic); (5) fishing vessel training programs; (6) course project on design of safe equipment; (7) educational meetings on general farm safety and health, pesticide safety, woodlot safety, infectious insects and other areas noted above; and 8) educational materials purchased, developed and/or distributed (those developed include pesticide and tick wallet cards in English and Spanish, and 10 fact sheets on subjects such as woodlots, mowers, farm equipment buildings, livestock, and pesticides.)

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Currently available information has been collected from various sources such as the New Jersey Department of Health and insurance companies and provides direction for development of educational programs. A detailed study of the accidents and illnesses incurred by migrant farm laborers is currently being conducted.

2. Research (etiology, methodology, control): Causes of accidents and illnesses among migrant farm workers are being documented.

3. Intervention (populations at risk, risk factors, control actions): The populations at greatest risk are the migrant farm workers, others who work with horticultural crops, and fishermen. Risk is high because of limited safety devices or precautions for unique equipment, high exposure, and little training. Educational materials (i.e., fact sheets and warning labels) coupled with direct training programs are being used.

Evaluability Assessment

Numbers of agricultural workers participating in educational meetings or securing educational materials, pre- and post-tests, and numbers of individuals completing/passing training or audit programs are being documented.

New York (NY-1)

Project Title: Agriculture Health Nurse Program for New York State

Project Director: James M. Melius, M.D., Dr.P.H.

Institution, Address:
New York State Department of Health
2 University Place
Albany, NY 12203-3399
Phone: 518-458-6433 **FAX:** 518-458-6434

Personnel and Skills: G. Casey, S. Roerig, J. Boyd and M. Anderson (agricultural health nurses).

Problems (diseases, injuries, hazards) Addressed: Occupational injuries and illnesses among agricultural workers focusing on fatalities and serious injuries, respiratory diseases and pesticide poisonings.

Project Objective: To develop surveillance for agricultural injuries and illnesses; to develop and implement preventive programs; and to assist with medical and social services follow-up.

Executive Summary

This project is developing a surveillance and follow-up program for occupational injuries and illnesses among agricultural workers in New York State. The program is currently staffed by three agricultural nurses located at occupational health clinics in three areas of the state (a fourth will be added in the near future). Through contacts with farm groups, extension service, and local medical providers, the nurses conduct surveillance for occupational injuries, respiratory diseases, and pesticide poisonings. The nurses conduct case follow-up and provide assistance for follow-up care and preventive steps. Initial implementation of the program has been very successful.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Contacts with farm groups, extension agents, and local medical providers are being developed for surveillance cases. State-wide pesticide poisoning center is also helpful. Case follow-up includes defined set of information on each case.

2. Research (etiology, methodology, control): Not relevant at present, but this program is linked to ongoing research projects on agricultural injuries and illnesses.

3. Intervention (populations at risk, risk factors, control actions): This includes assistance to the injured or ill farmers in obtaining medical care and social services; implementation of preventive steps at each farm; and review of cases to identify statewide preventive steps.

Evaluability Assessment

Standard data collection will form basis for evaluation of program.

New York (NY-2)

Project Title: Farm Family Health and Hazard Survey

Project Director: James M. Melius, M.D., Dr.P.H.

Institution, Address:
New York State Department of Health
2 University Place
Albany, NY 12203-3399
Phone: 518-458-6433 **FAX:** 518-458-6434

Personnel and Skills: J. Melius, physician/epidemiology; NYCAMH - J. May and D. Pratt, physicians; S. Davis, coordinator, Cornell; J. Pollock and E. Hallman, agricultural engineering.

Problems (diseases, injuries, hazards) Addressed: General farm hazards, injuries, and illnesses.

Project Objective: To conduct survey of representative sample of New York state farmers to identify safety and health hazards and evaluate current health status.

Executive Summary

This survey will include site visits to a sample of approximately 1000 farms in New York state to identify health and safety hazards. Health interviews and examinations will be conducted on a sample of farmers and farm workers from these farms. Survey instruments are currently being designed and tested. Four major farm types will be included: dairy, other livestock, fruits and vegetable, and other grains.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* See above.

2. *Research (etiology, methodology, control):* See above.

3. *Intervention (populations at risk, risk factors, control actions):* Possible preventive actions will be identified.

Evaluability Assessment

Present criteria for dissemination effectiveness, impact on target audiences.

North Carolina (NC-1)

Project Title: Farm Injury Project

Project Director: Susan A. Randolph

Institution, Address:
DEHNR, Occupational Health Section
P.O. Box 27687
Raleigh, NC 27611-7676
Phone: 919-733-3730 **FAX:** 919-733-9555

Personnel and Skills: Susan A. Randolph, M.S.M., R.N., COHN (director); Joan A. McGuire, M.S., R.N. (coordinator); Bonnie Boyd, R.N. (field nurse); Penny Cowan, R.N. (field nurse); and Maureen Hastings, B.S.N., R.N. (field nurse).

Problems (diseases, injuries, hazards) Addressed: All known and suspected injuries to farmers, farm family members, and farm workers including migrant and seasonal farmworkers who are engaged in agricultural work or farm business, or exposed to farm hazards.

Project Objectives: Develop and implement a community-based system of reporting agriculture-related morbidity and mortality; develop a process of case follow-up of injuries to farm workers and their families; determine the perceptions of farm workers about occupational hazards through focus groups; and plan and provide occupational health education, health promotion, and injury prevention services to farm workers.

Executive Summary

The surveillance system is in place in four counties in eastern North Carolina, which is an important agricultural area for tobacco, peanuts, soybeans, hogs, and other commodities. Staff have been involved in numerous activities to promote the reporting of farm injuries; toll-free 800 telephone number, contacts with potential reporters, display booth at area farm shows, presentations to local, state, and regional groups, and development and use of fliers and pamphlets about the Project. In addition, a news release about the Project was distributed. A brief survey of farmers in the Project area indicated that almost 16 percent reported an injury within the last 5 years. The three leading causes of injury were other farm machinery (36.4 percent), falls (28.3 percent), and tractors (16.2 percent). Since August 1991, 13 injuries have been reported and three case follow-up interviews have been completed. Plans are underway to conduct focus groups in the area.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Because minimal data exist regarding farm injuries in North Carolina, we established a community-based surveillance system in a geographic area. Cooperative reporting agreements have been arranged with a variety of reporters, including community hospitals, doctors, local health departments, dentists, veterinarians, and other health care providers. In some instances a health care provider reported a farm injury shortly after a field nurse visit. In addition, the cooperative extension service Farm Bureau, and university faculty (ECU and UNC-Chapel Hill) have been instrumental in creative approaches to surveillance. We have been approved to collect data from the Level I trauma service/emergency department in the area and are in the process of obtaining approval from the ECU

Shool of Medicine. As the 1992 planting season begins, reports of farm injuries should increase. Once an injury is reported, the field nurse initiates case follow-up within five working days. The follow-up consists of a face-to-face interview with the injured person.

2. Research (etiology, methodology, control): Not relevant.

3. Intervention (Populations at risk, risk factors, control actions): Based on the injury reports and knowledge gained from focus groups, targeted interventions will be developed and implemented. We will work with existing groups on prevention efforts including bilingual interventions. Each field nurse will become a resource person in two different areas; a specific population group (i.e., farm children, farm wives, migrant and seasonal farmworkers, etc.) and a topic area (i.e., swine confinement, respiratory protection, pesticides, etc.).

Evaluability Assessment
Not relevant.

North Carolina (NC-2)

Project Title: North Carolina Agricultural Health Promotion Systems

Project Director: Robert L. McLymore

Institution, Address:
North Carolina State University
P. O. Box 7625
Raleigh, NC 27695-7625
Phone: 919-515-6771 **FAX:** 919-515-6772

Personnel and Skills: Robert L. McLymore, M.S., project director; Barbara K. Garland, M.P.H., Ph.D., epidemiologist; Gary Roberson, Ph.D., biological and agricultural engineering faculty; Steve Derthick, M.P.H., health promotion specialist; Connie Woodell, secretary; Steve Dillon, program assistant; James Cowan, D.V.M., intern, public health veterinarian.

Problems (diseases, injuries, hazards) Addressed: Injuries and deaths caused by agricultural machinery, illnesses related to swine and poultry confinement enterprises, acute and chronic illnesses related to pesticide usage, and injuries related to large animal handling.

Project Objective: To organize, implement, and evaluate a program to reduce hazards associated with mortality and morbidity in agricultural workers in North Carolina through the North Carolina Cooperative Extension Service.

Executive Summary

Cultivated NCSU and NC Cooperative Extension Service institutional support of AHPS through active dialogue and involvement of key administrators, extension agents, and community-based Extension Advisory System Leadership. Trained 25 cooperative extension agents on agricultural health and safety concerns, prevention strategies, and educational materials. Created a library of reference material on the following topics: prevention of mechanical hazards, prevention of human illnesses associated with swine and poultry enterprises, use of pesticide protective clothing, laundering of pesticide contaminated clothing, and safe large animal handling. Organized materials for two educational modules on "Machinery Hazards," and "Confinement Illnesses Affecting Humans in Swine and Poultry Enterprises." Selected eight courses in the College of Agricultural and Life Sciences at North Carolina State University most likely to benefit from an agricultural safety and health curriculum. Pilot tested AHPS curriculum in two of these classes during the Fall 1991 semester. Developed course materials for East Carolina School of Medicine titled, "Health and Safety Focus on Animal Housing Operations." Employed a health promotion specialist for development of bilingual material and initiation of a lay health advisor program for agricultural workers. Identified and began working with Extension Agents and agricultural workers from two counties for piloting bilingual materials and lay health advisor programming.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response: Collaborated in assessing agricultural morbidity and mortality with the NIOSH-funded North Carolina Nurse's Surveillance Project. Also conducted agricultural surveillance with other agencies which serve on the AHPS Advisory Committee. Developed directory of newspaper clippings outlining the incidence and underlying causes of NC agricultural illnesses, injuries, and deaths.

2. Research (etiology, methodology, control): Not applicable.

3. Intervention (populations at risk, risk factors, control actions): North Carolina populations at greatest risk for agricultural illnesses, injuries, deaths are youth, the elderly, low income agricultural workers, migrant and seasonal farmworkers. High risk activities which AHPS is addressing include operating harvesting, tillage, feed, and grooming equipment, pesticide application; operation of swine and poultry enterprises, and large animal handling. AHPS interventions addressing NC agricultural safety and health, as outlined in the above Executive Summary, include: strategic coalition building within NCSU and with other NC agencies and organizations, Extension Agent training, educational materials development and dissemination, development of bilingual teaching materials, and piloting lay health advisor programs for agricultural workers in two counties. Co-sponsored program with John Deere district representative to farmers and workers on the dangers associated with equipment handling and safety on the farm. Collaborated with the North Carolina Primary Care Association to address programs for the migrant and seasonal worker audience in North Carolina. Planned the 1991 North Carolina State Fair Exhibit with representatives from the Injury Control Division and Division of Epidemiology, NCDEHNR, NC Department of Agriculture, and North Carolina State University Faculty.

Evaluability Assessment

Indications of initial AHPS success include increased requests by extension agents and the communities they represent for agricultural safety and health information and programs. Agricultural workers are attending training sessions offered on various subject matter related to their occupations. University professors in the agricultural and medical sciences are beginning to incorporate agricultural safety and health information in their curricula.

North Dakota (ND-1)

Project Title: Occupational and Safety Surveillance Through Health Departments and Nurses in Agricultural Communities

Project Director: Larry A. Shireley

Institution, Address:
North Dakota State Department of Health and Consolidated Laboratories
Disease Control
600 E Boulevard Avenue
Bismarck, ND 58505-0200
Phone: 701-224-2378 **FAX:** 701-224-4727

Personnel and Skills: L. Shireley, epidemiologist; R. Gilmore, program manager; L. Thompson, field nurse; C. Hagen, field nurse; R. Eisenbarth, field nurse; L. Dobler, field nurse; C. Carlson, field nurse.

Problems (diseases, injuries, hazards) Addressed: All injuries, diseases, and occupational hazards associated with agricultural workers in North Dakota.

Project Objective: Develop and implement a surveillance system for agricultural illnesses and injuries. Describe the epidemiology of agricultural injuries and illnesses among agricultural workers in North Dakota.

Executive Summary

Five agricultural occupational health nurses have been employed to conduct state-wide surveillance of agricultural-related injuries and illnesses. Each nurse is responsible for a defined geographical area and conducts active surveillance with health care facilities and personnel within this area. As appropriate, the nurse conducts interviews with the injured or ill worker to provide further information regarding factors contributing to the condition. This information is forwarded to the North Dakota State Department of Health and Consolidated Laboratories (NDSDHCL) for compilation, review, and analysis. During 1991, the first full year of the project, preliminary data indicates that 546 agricultural injuries were reported; 10 resulting in fatalities. Agricultural machines and livestock were the leading causes of the injuries. An additional 56 exposures to agricultural chemicals were reported; 82 percent due to pesticide exposure. The occupational nurses have also actively participated in numerous community agricultural safety educational programs.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Active surveillance has been conducted for one complete calendar year with data being transferred from each of the nurses to the NDSDHCL for analysis. Reports have been received from approximately 175 health care providers and 35 facilities. Continued liaison is being conducted to improve surveillance. Other data sources to augment the surveillance program such as the North Dakota Workers Compensation Bureau are also being investigated.

2. Research (etiology, methodology, control): Not relevant.

3. Intervention (population at risk, risk factors, control actions): Not relevant.

Evaluability Assessment

The referrals and the number of reports being received by the nurses provide a valid assessment of the surveillance system. Furthermore, the requests for the nurses to participate in community programs such as health fairs, agricultural shows, the North Dakota Agricultural Extension Service pesticide, and tractor safety programs are also measures of the visibility of the program.

Ohio (OH-1)

Project Title: National Surveillance in Agricultural Communities in Ohio

Project Director: Nan Migliozzi, R.N., M.S.N., COHN

Institution, Address:
Ohio Department of Health, Bureau of Occupational Health
P.O. Box 118
Columbus, OH 43266-0118
Phone: 614-466-4183 **FAX:** 614-752-8739

Personnel and Skills: Nan Migliozzi, M.S.N., and Genevieve Szuba, M.S.N., R.N., safety and health consultants; Mary Fleming, R.N., Kathryn Sample, R.N., and Beverly Slabaugh, R.N., agricultural health nurses.

Problems (diseases, injuries, hazards) Addressed: Work-related injuries and illnesses are identified at three rural hospitals in Ohio. A data base is being maintained of all these diseases and injuries. All injuries identified through the system are targeted for more extensive follow-up activities.

Project Objectives:

1. Develop, implement, and maintain a community-based system of reporting agricultural job-related diseases and injuries through three hospitals in Ohio.

2. Provide systematic follow-up of all agriculturally-related injuries identified through the surveillance system.

3. Provide health education and promotion outreach that incorporates vocational classes, health classes, and other appropriate areas.

Executive Summary

Agricultural workers and their families experience a disproportionate share of fatalities, injuries, and diseases associated with numerous chemical, biological, and physical hazards. The fatality rate for the agricultural industry is 2.6 times greater than the national average for all industries. In 1987, the U.S. Census recorded 79,277 Ohio farms. Ohio is a major producer of corn, wheat, and soybeans. It is sixth among all states in corn and soybean production and 13th in wheat production. Ohio also has numerous dairy farms. It is ranked seventh among all states in milk production. Ohio is an important livestock state and poultry farming is expanding. One of the major concerns is that entire families are exposed to health hazards of the farm work environment. Three rural Ohio hospitals function as surveillance sites. Collectively, they serve 14 Ohio counties.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): The agricultural health nurse at each of three Ohio hospitals identifies cases of farm-related disease and injury by reviewing hospital admissions, discharges, and emergency room reports. Other cases may be reported directly to the nurse by physicians, individuals, or local health departments. All agricultural occupational injuries receive follow-up interviews and site visits where appropriate.

2. Research (etiology, methodology, control): Not relevant.

3. *Intervention (populations at risk, risk factors, control actions):* Nurses will make follow-up telephone interviews and farm site visits during which educational intervention will take place. Safety and health curricula will be assessed at secondary and vocational schools and technical colleges. Resources will be developed to improve those programs.

Evaluability Assessment

Data collection has just begun over the last quarter. Cases of preventable disease and injuries have already been identified and strategies undertaken to prevent occurrence in a case of tetanus, and the community education that was done as a result.

Ohio (OH-2)

Project Title: *Ohio* Agriculture Health Promotion Systems

Project Director: Thomas L. Bean, Ph.D.

Institution, Address:
The Ohio State University, Agricultural Engineering Dept.
590 Woody Hayes Drive
Columbus, OH 43210-1057
Phone: 614-292-6519/9455 **FAX:** 614-292-9446

Personnel and Skills: Dr. Tom Bean, extension safety leader; Mr. Tim Lawrence, safety extension associate; Dr. Larry Brown, soil and water management; Dr. Tom Carpenter, agricultural Machinery, Dr. Joe Gliem, mechanical systems, Dr. Bob Gustafson, Dr. Erdal Ozkan; Dr. Mike Veenhuizen, livestock systems; Dr. Judy Wessel, family resource management (College of Human Ecology), and Dr. Jay Wilkins, preventive medicine (College of Medicine).

Problems (diseases, injuries, hazards) Addressed: Injuries, death and illnesses resulting from machinery, chemical, environmental, electrical, fire, and livestock hazards.

Project Objective: Develop and deliver training, information, and educational programs and materials based on a needs analysis.

Executive Summary

An Ohio accident survey and a literature review are completed. Extension fact sheets, safety literature, and safety videos and films have been reviewed and cataloged. An audio-visual loan library has been established. Extension safety literature produced as a part of the NIOSH effort includes seven fact sheets and two leaflets. New publications currently under development are eight fact sheets, two flyers, and three instructional modules. As a result of good relations with a number of multiplier groups, 22 workshops were conducted in 1991, with a total attendance of 1100 people. Regular contact with the media provides a continual awareness of agricultural safety and health issues. A 1200 farm survey determined the type of agricultural vehicles used on Ohio highways, the extent and nature of past highway accidents, the farmer's perceptions of agricultural highway safety program needs, and delivery networks. Special projects include a Horse and Buggy Highway Safety program in Amish schools and Ag Rescue/First on the Scene programs. The revised "Agricultural Health and Safety" course is now in progress. A capstone course, "Agricultural Health and Safety - Issues of the Contemporary World," is in the final stages of university approval and is scheduled to be taught the autumn of 1992.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): In-house data bank consisting of injury and fatality news clippings from newspapers throughout Ohio, Ohio Farm Bureau insurance records, and Workers' Compensation fund data. Death certificates are in the process of being added. Information used to develop education materials and programs.

2. Research (etiology, methodology, control): A 1200 farm survey determined the type of agricultural vehicles used on Ohio highways, the extent and nature of past highway accidents, the farmer's perceptions of agricultural highway safety program needs, and delivery networks. Funds for this project provided by the Ohio Farm and Home Safety Committee and Ohio Department of Highway Safety.

3. Intervention (populations at risk, risk factors, control actions): Populations at risk (PAR) include farmers, farm families, agricultural workers, farm contractors, and farm visitors. A sample of risk factors include machinery, chemical, environmental, electrical, fire, and livestock hazards. The PAR is being addressed through dissemination of educational material, delivery of training and educational program, information diffusion through the mass media, and development of educational materials for use by multiplier groups.

Evaluability Assessment

An internal evaluation plan is in effect. Programs and materials are reviewed and evaluated. Continued material development and educational developments over an extended period (five to ten years) should reduce the agricultural injury and death rates.

Ohio (OH-3)

Project Title: Farm Family Health and Hazard Surveillance Program for Cash Grain Farmers in Ohio

Project Director: Dr. J.R. Wilkins, III, Dr.P.H.

Institution, Address:
Ohio State University, Department of Preventive Medicine
320 West Tenth Avenue
Columbus, Ohio 43210
Phone: 614-293-3897 **FAX:** 614-293-3937

Personnel and Skills: J. Wilkins, epidemiologist; T. Bean, safety specialist; M. Moeschberger, biostatistician; J. Gaeuman, physician; C. Heaney, health educator; F. Hall, entomologist; L. Mitchell, programmer.

Problems (diseases, injuries, hazards) Addressed: Stress, respiratory disease, hearing loss, trauma, skin conditions, symptoms of neurotoxicity, cancer, pesticide exposure, all on-farm hazards.

Project Objectives: To collect surveillance data on farm-related health status and health hazards by conducting a direct, multiple-phase survey of Ohio cash grain farm operators and eligible family members.

Executive Summary

A multiple-phase, population-based health and hazard study of Ohio cash grain farmers and eligible family members will be conducted. The project was designed as a five-year collaborative effort between Ohio State University, CDC/NIOSH, and the State of Ohio. In Phase 1 of the project period, a stratified random sample of 4,860 cash grain farms will be selected from a comprehensive statewide roster, with stratification by size of farm (in acres). A mixed-mode survey (i.e., a self-administered, mailed questionnaire, with telephone follow-up of mail nonrespondents) will then be conducted to obtain relevant health and hazard data. The content of the questionnaire and its design is modeled to a great extent after NCHS's National Health Interview Survey, a national health survey of the civilian noninstitutionalized population of the United States.

In Phase 2, a subsample of eligible Phase-1 respondents whose farms are located in the 20-county central Ohio area will be invited to participate in a program of on-farm hazard assessments and nurse-conducted in-home health examinations. Procedures employed for collection of Phase-2 health data will be modeled after NCHS's Third National Health and Nutrition Examination Survey (NHANES III). To the extent possible, the collection of the Phase-2 hazard data will be modeled after NIOSH's National Occupational Exposure Survey. With respect to the collection of the Phase-2 health data, attempts will be made to recruit 624 farm families. For each eligible and participating household member, the following procedures will be performed by a specially-trained public health nurse, according to a standardized protocol: spirometry, and measurement of height, weight, and blood pressure. With respect to the (concurrent) collection of Phase-2 hazard data from the same subsample of farms, a specially-trained two-person Hazard Technician team will conduct on-farm hazard assessments to obtain (qualitative and quantitative) information on work-related risk factors. In Phase 3, subsample of farm operators will be asked to participate in a program of personal exposure monitoring, with a focus on noise and airborne exposure to dust and selected pesticides. One data collection effort in Phase 3 will involve attempts to collect pesticide exposure data from all residents in the participating domiciles by monitoring levels of selected urinary metabolites. In addition to the urinary metabolite analyses, airborne levels of exposure experienced by the operator/applicator will be monitored by air sampling pumps as in Phase 2, and, in addition, by application of passive dosimetry techniques. Data collection will begin after OMB approval of all procedures is obtained.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* As noted above, a wide range of health and hazard surveillance data will be collected from cash grain farms in Ohio.

2. *Research (etiology, methodology, control):* See executive summary for methodology.

3. *Intervention (populations at risk, risk factors, control actions):* Survey results will be used to design appropriate intervention strategies.

Evaluability Assessment

Dissemination will be evaluated by frequency and timeliness of publication and reports to Ohio State University Extension Agents, health providers, and farm population.

Ohio (NIOSH-1)

Project Title: Biological Monitoring for Aryl Amines

Project Director: Kenneth L. Cheever, M.S.

Institution, Address:
National Institute for Occupational Safety and Health
Mail Stop C-23
4676 Columbia Parkway
Cincinnati, OH 45226
Phone: 513-533-8193 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. supervisory toxicologist; one M.S. research toxicologist; one M.S. research chemist; one biological laboratory technician.

Problems (diseases, injuries, hazards) Addressed: Occupational cancers.

Project Objectives:

1. Develop methods for monitoring carcinogen biological markers.

2. Evaluate the stability of hemoglobin and DNA biomarkers in an appropriate animal model and assess worker populations potentially exposed to carcinogens using the methodologies developed.

Executive Summary

Two model aryl amines (*o*-toluidine and MOCA) have been shown to be carcinogens in animals, and epidemiological studies suggest that these compounds are bladder carcinogens in humans. Methods that were developed to assess delivery of amine or an active metabolite to target issues and will provide a more useful measure of risk than traditional environmental monitoring methods. Other aryl amines used in agriculture may have similar effects. This research project will continue to improve analysis techniques which were developed for analysis of carcinogenic aryl amines and will develop other methods for detecting target organ damage by agricultural carcinogens.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): This project is not a surveillance activity.

2. Research (etiology, methodology, control): The basic research portion of this project involves the development of new and sensitive techniques for the detection of biologically effective exposures utilizing DNA and hemoglobin adducts as indicators of carcinogen exposure. Hemoglobin analyses by both high performance liquid chromatography with fluorescence detection and gas chromatography of derivatized amines have been developed and continue to be evaluated for both humans and laboratory animals. The highly sensitive ^{32}P-post-labeling procedure for detection of target DNA reaction with carcinogenic amines is currently being evaluated for routine quantification of MOCA and *o*-toluidine exposure.

3. Intervention (populations at risk, risk factors, control actions): Populations at risk are agricultural workers exposed to pesticides or herbicides.

Evaluability Assessment

(Present criteria for dissemination effectiveness, impact on target audiences, and associated outcome) The Laboratory Information Management system for chromatography has enhanced the data handling and storage for the project. Upgraded computer systems have made it possible to process chromatography data. The post-labeling assay has been applied to exfoliated bladder cells, and will be evaluated for other tissues.

Ohio (NIOSH-2)

Project Title: Methods for Determining Evidence of Spermatogenic Damage

Project Director: Steven M. Schrader, Ph.D.

Institution, Address:
National Institute for Occupational Safety and Health
Mail Stop C-23
4676 Columbia Parkway
Cincinnati, Ohio 45226-1998
Phone: 513-533-8210 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. research reproductive toxicologist; one M.S. research toxicologist; two B.S. biologists; one biological laboratory technician.

Problems (diseases, injuries, hazards) Addressed: Occupational hazards to the male reproductive system.

Project Objectives:

1. Develop methods to assess occupational damage to the male reproductive system.

2. Use the most reliable and useful methodologies available; assess worker populations potentially exposed to reproductive toxicants.

Executive Summary

Two agriculture pesticides (dibromochloropropane and ethylene dibromide) have been shown to be the most severe male reproductive toxicants studied. Other agricultural chemicals may have similar effects, however, current methodologies may not be sensitive enough to detect the effects or they may be effects for which there are not reliable assays to assess the workers. This research project will improve existing analysis methods and develop other methods for detecting damage to the male reproductive system.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): This project is not a surveillance activity.

2. Research (etiology, methodology, control): The basic-research portion of this project is devoted to improving existing methodologies as well as developing new methodologies for field assessment. Sperm motility and morphometry methods are currently being improved. Methods in assessing the genetic damage to sperm cells are currently being developed.

3. Intervention (populations at risk, risk factors, control actions): Studies will be across several populations with the possibility of adverse reproductive effects.

Evaluability Assessment

Computerized assessment of spermatozoan motility and morphology has been greatly enhanced with increased computer storage and speed of analysis. Many more workers can be studied in less time and with more accuracy. The DNA stability assay is being established and validated in our laboratory.

Ohio (NIOSH-3)

Project Title: Immunotoxicology Research and Support

Project Director: Lloyd E. Stettler, Ph.D.

Institution, Address:
National Institute for Occupational Safety and Health
Mail Stop C-26
4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513-533-8433 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. immunotoxicologist (vacancy); one Ph.D. immunochemist; one B.S. biologist.

Problems (diseases, injuries, hazards) Addressed: This project provides biological monitoring support for the assessment of workplace exposures to toxic chemicals.

Project Objective: The objective of this project is to develop new immunochemical biological monitoring methods which are then applied through the Institute's Health Hazard Evaluation program to assess workplace exposures.

Executive Summary

A commercially-available ELISA kit, developed for measuring alachlor in ground water, was modified and used to analyze 135 urine samples collected from alachlor applicators through a field study by IWSB, DSHEFS. The method proved to be an excellent qualitative screen for exposure, as the results from the ELISA urinary assays correlated very well with results obtained from a gas chromatographic (GC) method. The major conclusion reached was that exposed applicators had much higher body burdens of alachlor than was previously thought.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Surveillance is not a component of this project. The project was undertaken as a result of field work conducted by DSHEFS.

2. *Research (etiology, methodology, control):* The immunochemical biological monitoring method developed for alachlor can be used to determine alachlor exposures via field studies.

3. *Intervention (populations at risk, risk factors, control actions):* Populations at risk are pesticide applicators. Knowledge of exposure gained from biological monitoring should drive action to control exposures.

Evaluability Assessment

Biological monitoring provides data on exposure and can be used to monitor the effectiveness of control programs.

Ohio (NIOSH-4)

Project Title: Biological Monitoring Research and Support

Project Director: Alexander W. Teass, Ph.D.

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Cincinnati, OH 45226
Phone: 513-533-8130 **FAX:** 513-533-8510

Personnel and Skills: Four Ph.D. analytical chemists; one B.S. analytical chemist.

Problems (diseases, injuries, hazards) Addressed: This project provides biological monitoring support for the assessment of workplace exposures to toxic chemicals.

Project Objective: The objective of this project is to develop new biological monitoring methods that are then applied through the Institute's Health Hazard Evaluation program to assess workplace exposures.

Executive Summary

A biological monitoring method using high performance liquid chromatography (HPLC) to measure two major alachlor metabolites in human urine has been developed. The method utilizes solid phase extraction which minimizes sample workup problems encountered with a literature method for alachlor monitoring. The new method is currently undergoing laboratory validation studies. When validation is completed, the method will be used to analyze urines collected in a DSHEFS study of alachlor applicators.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Not applicable.

2. *Research (etiology, methodology, control):* The biological monitoring method developed for alachlor can be used to determine alachlor exposures via field studies.

3. *Intervention (populations at risk, risk factors, control actions):* Populations at risk are pesticide applicators.

Ohio (NIOSH-5)

Project Title: In Vitro Systems for Human Biological Monitoring

Project Director: Mark Toraason, Ph.D.

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Cincinnati, OH 45226-1998
Phone: 513-533-8207 **FAX:** 513-533-8510

Personnel and Skills: Three Ph.D. toxicologists; one M.S. chemist; three biological laboratory technicians.

Problems (diseases, injuries, hazards) Addressed: Cancer, disorders of reproduction, cardiovascular disease.

Project Objective: Develop methods for screening and investigating the mechanism of action at the cellular level of toxicants, including insecticides and fungicides. Develop biomonitors of the effect of toxicants.

Executive Summary

Metabolism of toxicants can induce oxidative stress that overwhelms the antioxidant defense mechanisms of individual cells. Oxidative damage has been implicated in the pathogenesis of aging, cancer, and acute organ damage. Highly reactive oxygen species can cause lipid peroxidation and DNA damage. Urinary byproducts of this damage may serve as biomarkers of chemical effects. Cultured cells will be used to assess the metabolism of workplace chemicals to highly reactive metabolites that exceed cellular antioxidant defenses. The potential for halogenated alkanes to exacerbate myocardial damage during a free radical inducing ischemic episode will be determined. Carcinogenic and noncarcinogenic fungicides will be compared for their ability to cause lipid peroxidation and oxidative DNA damage in human keratinocytes and rodent hepatocytes.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*
2. *Research (etiology, methodology, control):*
3. *Intervention (populations at risk, risk factors, control actions):*

Ohio (NIOSH-6)

Project Title: Environmental Assessment of Exposure to Alachlor

Project Director: Wayne T. Sanderson

Institution, Address:
NIOSH
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Cincinnati, OH 45226
Phone: 513-841-4314 **FAX:** 513-841-4486

Personnel and Skills: NIOSH, DSHEFS, IWSB: two industrial hygienists; NIOSH, DBBS, ABB: one toxicologist.

Problems (diseases, injuries, hazards) Addressed: Potential exposure to a herbicide known to be an animal carcinogen.

Project Objective: To assess the exposures of commercial pesticide applicators who use alachlor as one of their main herbicides.

Executive Summary

We characterized two exposures and absorbed doses for 20 applicators and seven mixers who were applying alachlor to corn and soybean cropland in Illinois and Ohio. Breathing zone air samples, clothing patch samples, and hand wash samples were collected to estimate exposures. Urine samples were collected to estimate absorbed doses. The thighs and hands were areas of the body found to receive the greatest exposure. Absorbed dose was found to increase with increasing air and skin exposures.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

2. *Research (etiology, methodology, control):* This study was conducted to assess the nature and extent of applicators' exposure to an animal carcinogen.

3. *Intervention (populations at risk, risk factors, control actions):* Each participant was provided results of individual tests, a summary of the overall results, and recommendations for reducing exposures. An article was prepared for a widely read farm journal, and the results will be published in the scientific literature.

Ohio (NIOSH-7)

Project Title: Neurobehavioral Assessment of Pesticide Applicators

Project Director: John Russo, Ph.D.

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4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513-533-8383 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. research psychologist; one B.A. research psychologist.

Problems (diseases, injuries, hazards) Addressed: Neurotoxic disorders.

Project Objectives:

1. Identify the persistence/recovery of selected neurobehavioral symptoms in agricultural workers after acute poisoning by organophosphate pesticides.

2. Evaluate selected aspects of neurobehavioral performance in workers at risk for acute and/or chronic exposure to methyl bromide.

Executive Summary

In separate studies, organophosphate-poisoned or -exposed workers in California and fumigant-exposed workers in Florida are being examined for indications of impairment of motor and cognitive abilities. The performance levels of poisoned vs. control, and exposed vs. control cohorts are being compared using the Neurobehavioral Evaluation System (NES), selected tests from the World Health Organization-recommended Neurobehavioral Core Test Battery (WHO-NCTB), and computerized postural stability tests.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): This project is not a surveillance activity.

2. Research (etiology, methodology, control): This is a joint project between NIOSH's Division of Biomedical and Behavioral Science, Applied Psychology and Ergonomics Branch, Neurotoxicology Research Section, and the Division of Surveillance, Hazard Evaluations and Field Studies, Industrywide Studies Branch.

3. Intervention (populations at risk, risk factors, control actions): The populations at risk include pesticide formulators, mixers, handlers, and applicators, as well as farmers and farm workers (including migrants).

Ohio (NIOSH-8)

Project Title: Immunologic Markers of Herbicide Exposure

Project Director: Raymond E. Biagini, Ph.D.

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4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513-533-8196 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. immunochemist/immunotoxicologist; one M.A. chemist.

Problems (diseases, injuries, hazards) Addressed: Immunotoxicology of the herbicide *alachlor*.

Project Objective: The purpose of this study is to identify potential immunologic changes in animals and humans resulting from exposure to alachlor.

Executive Summary

A study to investigate the potential immunotoxicity of alachlor in F344 rats was completed. Evaluations were made of humoral immunity, cell-mediated immunity, natural killer cell activity, and hematologic and immunopathologic effects. The results showed that alachlor had no statistically significant toxic effects (compared to the vehicle controls) for any immunologic, hematologic, or pathologic endpoint evaluated at doses up to 75 percent of a reported LD_{100} dose in rats. Tests for specific antibodies to alachlor in rat serum were also negative.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Not applicable.

2. *Research (etiology, methodology, control):* Alachlor is not an immunotoxicant in rats.

3. *Intervention (populations at risk, risk factors, control actions):* Populations at risk are pesticide applicators.

Ohio (NIOSH-9)

Project Title: Noise-Induced Hearing Loss: Support for FFHH Survey

Project Director: Christa L. Themann, M.A.

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National Institute for Occupational Safety and Health
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4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513-533-8281 **FAX:** 513-533-8510

Personnel and Skills: One M.A. audiologist; one M.S. psychologist; one engineering technician.

Problems (diseases, injuries, hazards) Addressed: Noise-induced hearing loss.

Project Objective: To develop methods for noise and hearing sensitivity data collection and analysis to characterize noise-induced hearing loss among agricultural workers.

Executive Summary

This project provides expertise in the audiometric and noise measurement aspects of the Farm Family Health and Hazard Survey (FFHHS). DBBS personnel have assisted in the technical review of applications for cooperative agreement funding for FFHHS awards, designed the hearing loss module of the survey questionnaire, and written the protocols for audiometric testing and noise measurement. Continuing assistance will include training of FFHHS personnel (intramural and extramural) in the use of the questionnaire and protocols. Site visits will be made to each FFHHS awardee who includes audiometric testing or noise measurement in his or her survey. Consultative services regarding audiometric interpretation, hazardous effects of noise, correct use of hearing protectors, and hearing health promotion activities will be provided.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Data will provide information on the prevalence and incidence of noise-induced hearing loss among agricultural workers.

2. *Research (etiology, methodology, control):* Several noise and hearing loss studies will be conducted using questionnaires and field sampling strategies. These data will quantify the effects of various agricultural noise exposures on hearing.

3. *Intervention (populations at risk, risk factors, control actions):* Identification of agricultural noise environments that adversely affect hearing will permit intervention strategies to be developed for the specific noise conditions. Specific hearing conservation strategies will be developed and implemented.

Evaluability Assessment

Continued data collection will permit evaluation of the effectiveness of the implemented hearing conservation and noise control strategies.

Ohio (NIOSH-10)

Project Title: Hearing Conservation Programs for Underserved Workers

Project Director: John R. Franks, Ph.D.

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4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513-533-8281 **FAX:** 513-533-8510

Personnel and Skills: One Ph.D. audiologist; one M.S. psychologist; one engineering technician.

Problems (diseases, injuries, hazards) Addressed: Noise-induced hearing loss.

Project Objective: To assess the effects of noise on hearing (emphasis on impact noise) and to develop hearing conservation strategies for specific work environments.

Executive Summary

NIOSH estimates that many of the three million workers exposed to impulse and impact noise in the workplace are employed in the agriculture, construction, and the trades are not covered by hearing conservation regulations. While damage-risk criteria have been developed for continuous and time-varying noise, criteria for impact noise have not been developed because of the lack of human dose-response data. Unique impact noise situations will be identified and noise samples will be collected and analyzed. Information will be collected on noise control, audiometric testing, and hearing protection options. Model hearing conservation programs will be developed for some situations. Study sites will be selected and hearing conservation program effectiveness will be determined through a pre- and post-intervention questionnaire. Formula will be developed that describes the effects of occupational exposure to impact noise, and the results will be published in professional and trade journals.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Noise and hearing history data will be collected on selected populations of workers to quantify impact noise-induced hearing loss.

2. *Research (etiology, methodology, control):* Data collected on noise exposure and hearing loss will be used to define a dose-response curve for impact noise.

3. *Intervention (populations at risk, risk factors, control actions):* Hearing conservation programs will be developed and demonstrated for selected noise environments for which current hearing conservation practices are ineffective.

Evaluability Assessment

These outcomes will provide a basis for implementing more effective hearing conservation for over three million workers exposed to impact noise.

Ohio (NIOSH-11)

Project Title: Application of Process Hazard Analysis for Agricultural Chemicals

Project Director: Amy A. Beasley

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Division of Physical Sciences and Engineering
Cincinnati, OH 45226
Phone: 513-841-4381 **FAX:** 513-841-4506

Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: Hazardous chemical releases.

Project Objective: This project will identify and recommend preventive measures for ammonia releases and pesticide exposures in agricultural applications.

Executive Summary

Although there is no national systematic reporting of agricultural anhydrous ammonia incidents, reports reveal that there have been fatalities and numerous injuries due to anhydrous ammonia releases in Ohio. The seriousness of the health effects caused by anhydrous ammonia exposure, coupled with the widespread use of anhydrous ammonia, prompted NIOSH researchers to conduct a hazard and operability (HAZOP) study in an attempt to identify factors to reduce the likelihood of injury. This technique was used to identify potential problems with design or work practice, and to make suggestions for the elimination or reduction of these problems. This technique involves a systematic review of every piece of equipment used in the ammonia application operation. In FY 1990, a consulting contract was awarded and during FY 1991, the HAZOP was conducted by the contractor. Participants included representatives of an agricultural trade association, the Ohio Department of Agriculture, an application equipment manufacturer, a retail ammonia distributor, and an ammonia producer, as well as NIOSH researchers. A HAZOP report has been prepared, and the results will be presented at several professional conferences. In addition, the University of Missouri Agricultural Engineering Department will help NIOSH incorporate the results of the HAZOP into a brochure for ammonia retail outlets (through Farmland Industries-COOP, a distributor of ammonia equipment) and farmers through the state Agriculture Extension Services in Kansas, Nebraska, Oklahoma, Missouri, Iowa, and Ohio. Also, a talk on the use of process hazard analysis for prevention of injuries from anhydrous ammonia applications was presented at the Tenth Surgeon General's Conference: Agriculture Safety and Health.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

2. *Research (etiology, methodology, control):* Participants in the HAZOP included representatives of an agricultural trade association, the Ohio Department of Agriculture, an application equipment manufacturer, a retail ammonia distributor, and an ammonia producer, as well as NIOSH researchers.

3. *Intervention (populations at risk, risk factors, control actions):* The project has involved the Ohio Department of Agriculture, Ammonia Inspection Office, and will involve Agriculture Extension Services in Kansas, Nebraska, Iowa, Missouri, Oklahoma, and Ohio, and distributors of equipment for applying ammonia.

Evaluability Assessment

None.

Ohio (NIOSH-12)

Project Title: Development of Analytical Methods for Agricultural Chemicals

Project Director: Eugene R. Kennedy, Ph.D.

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Division of Physical Sciences and Engineering
Cincinnati, OH 45226
Phone: 513-841-4392 **FAX:** 513-841-4500

Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: Modern and convenient sampling and analytical methods are needed to assess chemical exposure to populations in agricultural communities.

Project Objective: This project will develop three sampling and analytical methods for pesticides or herbicides in air. Many of these compounds are suspected of causing cancer, reproductive, or neurotoxic disorders.

Executive Summary

An evaluation of sampling and analytical methods for agricultural chemicals in workplace air was initiated during FY 1991. This work was undertaken to consolidate and modernize current sampling and analytical methodology for these compounds and to respond to monitoring needs in the agricultural community. Two methods for multiple agricultural chemical analyses will be developed under contract. An experimental plan for the evaluation of methods for agricultural chemicals was prepared by NIOSH researchers and transmitted to the contract laboratory. Work is currently underway to evaluate the first method, which will address 19 organophosphorus pesticides. These methods would be available for use by industrial hygienists and others (e.g. agriculture extension agents) after suitable training in the collection workplace environment samples.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

2. *Research (etiology, methodology, control):* Completed sampling and analytical methods will be published in the NIOSH Manual of Analytical Methods and distributed by NIOSH and the Government Printing Office.

3. *Intervention (populations at risk, risk factors, control actions):*

Evaluability Assessment

None.

Ohio (NIOSH-13)

Project Title: Real Time Monitoring for Pesticides

Project Director: Judd C. Posner, Ph.D.

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Division of Physical Sciences and Engineering
Cincinnati, OH 45226
Phone: 513-841-4279 **FAX:** 513-841-4500

Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: Direct reading instruments to monitor agricultural pesticides are needed to define chemical exposures.

Project Objective: This project will investigate the application of instrumentation developed for monitoring nerve agents to pesticide determination.

Executive Summary

Commercial analogues of two instruments that were developed for the detection of organophosphorus nerve agents were identified. Testing has shown that both the ACAMS-related instrument and the ion mobility spectrometer derived from the Army CAM can detect organophosphate pesticides.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

2. *Research (etiology, methodology, control):* Completed exposure monitoring methods using direct reading instruments will be published in the NIOSH Manual of Analytical Methods and distributed by NIOSH and the Government Printing Office.

3. *Intervention (populations at risk, risk factors, control actions):*

Evaluability Assessment

None.

Ohio (NIOSH-14)

Project Title: Aerosol Sampler Performance Testing

Project Director: David Bartley, Ph.D.

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Division of Physical Sciences and Engineering
Cincinnati, OH 45226
Phone: 513-841-4277 **FAX:** 513-841-4500

Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: In order to improve the monitoring of toxic substances in workplace air, NIOSH is conducting research to modernize respirable dust sampler performance testing.

Project Objective: Develop improved approaches to the collection of toxic substances in workplace air.

Executive Summary

The "bias map" approach (originally developed within NIOSH) to aerosol sampler performance criteria has been selected for study. According to this approach, sampler accuracy is estimated using a combination of theory and measurement to estimate and control measurement errors to be expected in environments of actual sampler application. Most sampler characterization will be performed in a low air flow chamber. In addition, wind tunnel testing is considered necessary due to reported wind-related inaccuracies in the performance of the commonly used 10 mm nylon cyclone sampler. To this end, the building of a large, though inexpensive, wind tunnel is nearing completion. During the establishment of the necessary experimental apparatus, alternative approaches to analyzing the evaluation experiments have been developed. Fundamental improvements in traditional statistical methods have been found necessary to account for bias between alternative sampling methods as well as the uncertainty in standard or reference sampling methods so as to avoid unnecessarily eliminating accurate samplers. Related to this NIOSH research are the efforts of the International Standards Organization (ISO) and the Comité Européen de Normalization (CEN) to work towards common health standards internationally. At present, the bias map criteria constitute the approach of choice within Europe. Because of the overlap of interests, the NIOSH project director has become involved with several ISO and CEN Committees. As convener of an ISO working group, he has proposed that the working group compile a compendium of aerosol sampling methods utilizing each individual country's sampling equipment.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* The international standards are designed by requiring similarity between the human respiratory system and samplers as to how aerosol of a given size is captured. The intent is to attain high correlation between sampler results and hazard likelihood.

2. *Research (etiology, methodology, control):* The work is coordinated with the efforts of ISO and CEN to work toward common health standards internationally.

3. *Intervention (populations at risk, risk factors, control actions):* A large fraction of agricultural workers are likely at risk of exposure to the smallest silica particles associated with sandy soils. Measurement of this fraction and hazard control development have yet to begin.

Evaluability Assessment

Adoption by ISO and CEN.

Ohio (NIOSH-15)

Project Title: Evaluation and Control of Workplace Hazards Using Video Exposure Monitoring

Project Director: Michael G. Gressel

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Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: Because several studies have found significant hearing loss in agricultural workers, a study protocol was developed to monitor noise exposures in real-time.

Project Objective: A report will be written that can serve as a prototype for additional noise monitoring work using the Video Exposure Monitoring Technique.

Executive Summary

NIOSH has developed a new technique to identify the etiology of occupational exposure through the use of continuous real-time monitors and the simultaneous recording of work activities on videotape. This new technique can be applied to chemical or physical hazards, and is limited only by the existence of technology to continuously monitor the hazards involved. During FY 1991, a training program on this new technique was included as part of the NIOSH training schedule. Two training sessions have also been presented to industrial hygienists from state health departments under the NIOSH SENSOR Assistance Project. A manual summarizing this technique has been prepared as a NIOSH Technical Report and is undergoing review. To extend this technique to include new uses, a study has been undertaken to identify new continuous sensors that can be used in conjunction with videotaping, as well as new applications for the video/continuous monitoring concept. Because several studies have found significant hearing loss in agricultural workers, a study protocol was developed to monitor noise exposures in real-time, and an initial field study was conducted. The data from this study were evaluated and a second site visit was conducted, making minor modifications to the noise monitor settings in an attempt to improve the resolution of the data. Once the new data are analyzed, the need for additional field studies will be assessed. Following completion of the field studies, a report will be written detailing the field work. The report will include the application of the Video Exposure Monitoring Technique for noise monitoring, although the noise exposure levels also will be discussed. This report can serve as a prototype for additional noise monitoring work using the Video Exposure Monitoring Technique.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

2. *Research (etiology, methodology, control):*

3. *Intervention (populations at risk, risk factors, control actions):* A completed report will be published and provided to SENSOR states.

Evaluability Assessment

None.

Ohio (NIOSH-16)

Project Title: Study of Methyl Bromide Applicators: Exposure Assessment

Project Director: Virginia Ringenburg

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4676 Columbia Parkway, R14
Cincinnati, OH 45226
Phone: 513-841-4314 **FAX:** 513-841-4486

Personnel and Skills: NIOSH/IWSB: two industrial hygienists.

Problems (diseases, injuries, hazards) Addressed: Potential neurological and renal effects.

Project Objectives: To determine the nature and extent of potential occupational exposure to methyl bromide in agricultural application.

Executive Summary

Four industrial hygiene surveys of coil fumigators using methyl bromide have been completed in Florida. When evaluating the results of the surveys, however, problems with the previously validated NIOSH Analytical Method #2520 were discovered. NIOSH (DPSE) is currently reevaluating the method. Following the completion of the method evaluation, further exposure assessments will be conducted. The exposure information is being developed in support of a cross-sectional medical study of applicators of methyl bromide.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Exposure to high levels of methyl bromide are known to cause adverse neurological effects. Little is known, however, about the health effects of chronic, low-level exposure. Reports including recommendations regarding work practices and engineering controls will be forwarded to all facilities surveyed. This information will also be available for the medical portion of the methyl bromide study.

2. *Research (etiology, methodology, control):* This study was conducted to determine the nature and extent of applicators' exposures to methyl bromide in soil fumigation operations, and may be useful in designing follow-up studies in the future.

3. *Intervention (populations at risk, risk factors, control actions):* Intervention will depend on the study results (1993).

Evaluability Assessment

Each of the fumigation companies participating in this study will receive a copy of the final report. The results of this study will also be published in the scientific literature.

Ohio (NIOSH-17)

Project Title: Study of the Health Effects of Methyl Bromide on Fumigant Applicators

Project Director: Geoffrey Calvert, M.D., M.P.H.

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4676 Columbia Parkway
Cincinnati, OH 45226
Phone: 513-841-4481 **FAX:** 513-841-4486

Personnel and Skills: Geoffrey Calvert, M.D., M.P.H.; Tom Briggle, Ph.D.; Lora Fleming, M.D., M.P.H.

Problems (diseases, injuries, hazards) Addressed: Neurologic and renal health effects associated with chronic, low-level fumigant exposure.

Project Objectives: Assess the neurotoxic and renal effects associated with the workplace use of methyl bromide.

Executive Summary

We are conducting a cross-sectional study of fumigant applicators in the Miami area. The applicators must have been employed for at least six months and must have performed at least ten fumigations in the last 90 days. Each fumigant worker will be asked to bring a friend, who will serve as the worker's control, to the examination site. The study will consist of 140 fumigators and 140 controls. The study will investigate control nervous system, peripheral nervous system, renal system, and ocular effects of chronic, low-level methyl bromide exposure. This study is a collaborative effort with the University of Miami.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Exposure to high levels of methyl bromide are known to cause adverse neurological effects. Little is known, however, about the health effects of chronic, low-level exposure. This study was designed to address the need for more information on the toxicity of low-level methyl bromide exposure.

2. *Research (etiology, methodology, control):* This is a cross-sectional medical study of 140 exposed and 140 controls.

3. *Intervention (populations at risk, risk factors, control actions):* Plans for intervention will be developed after the final results for this study are available.

Evaluability Assessment

Each of the many fumigation companies participating in this study will receive a copy of the final report. A presentation will be made to the local Pest Control Association. The results of this study will also be published in the scientific literature.

Ohio (NIOSH-18)

Project Title: Case Control Study of Brain Cancer Among Farmers

Project Director: Geoffrey Calvert, M.D., M.P.H.

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Phone: 513-841-4481 **FAX:** 513-841-4486

Personnel and Skills: Geoffrey Calvert, M.D., M.P.H.; Paul Schulte, Ph.D.; Elizabeth Ward, Ph.D.; Raymond Alderfer, M.D., M.P.H.; Wayne Sanderson, C.I.H.

Problems (diseases, injuries, hazards) Addressed: Brain cancer in farmers.

Project Objectives: To conduct a case-control study of brain cancer among rural residents to identify farm and rural exposures that may be associated with brain cancer.

Executive Summary

Brain cancer cases will be sought from Wisconsin, Michigan, Minnesota, and Iowa. The cases must reside in a rural county and be between the ages of 18 and 80. We anticipate identifying 100-120 cases per year for three years. To avoid having to interview next of kin, cases will be identified and interviewed promptly after diagnosis. Controls will be selected from the case's county of residence and matched on age. The protocol for this study is currently under development.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* We will be identifying cases from 16-20 hospitals located in the participating states. We will use methods to ensure rapid case ascertainment. This is a collaborative effort with the University of Minnesota, Michigan State University, Marshfield Clinic, and Mercy Medical Center, Des Moines, Iowa.

2. *Research (etiology, methodology, control):* This is a case-control study to assess the rural and farm exposures that may be associated with brain cancer.

3. *Intervention (populations at risk, risk factors, control actions):* Plans for intervention will await the final results from the study.

Evaluability Assessment

Although the incidence of brain cancer is rising, little is known about the etiology of this cancer. Our study should identify exposures that increase the risk of brain cancer. Reductions in these exposures may reduce the incidence of brain cancer.

Ohio (NIOSH-19)

Project Title: Neurological Sequelae of Pesticide Poisoning

Project Director: Kyle Steenland, Ph.D.

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4676 Columbia Parkway
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Phone: 513-841-4203 **FAX:** 513-841-4486

Personnel and Skills: NIOSH, DSHEFS, IWSB: one epidemiologist, one administrative assistant; NIOSH, DBBS: two neurobehavioral specialists.

Problems (diseases, injuries, hazards) Addressed: Pesticide poisoning.

Project Objectives: To determine if there are chronic neurological sequelae to acute organophosphate pesticide poisoning.

Executive Summary

Cases of systemic acute organophosphate pesticide poisoning have been identified by the California pesticide surveillance program for the years 1982-1990. We are testing 100 of these cases and 100 nonpoisoned controls for peripheral and central neurologic function (nerve conduction, vibrometry, postural sway, neurobehavioral tests). An intermediate group of approximately 50 people (professional pesticide applicators with documented cholinesterase inhibition but without poisoning) will also be tested.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* A California surveillance system for pesticide poisoning and cholinesterase inhibition among professional applicators has been used to obtain subjects for this study (via California Department of Pesticide Regulation and the California Department of Health and Human Services).

2. *Research (etiology, methodology, control):* This is a cross-sectional study comparing poisoned to nonpoisoned subjects.

3. *Intervention (populations at risk, risk factors, control actions):* Intervention will depend on results of the study (1993).

Evaluability Assessment

Results will be disseminated to all study participants, and in a summary form, in the pertinent literature. The impact on the target population will depend on the results.

Ohio (NIOSH-20)

Project Title: Pesticide Exposure Among Peach Harvesters

Project Director: Kyle Steenland, Ph.D./NIOSH; John Ross/CA Dept. of Pest. Reg.

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Cincinnati, OH 45226
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Personnel and Skills: NIOSH, DSHEFS, IWSB: one epidemiologist; California Department of Pesticide Regulation: one toxicologist, two field workers.

Problems (diseases, injuries, hazards) Addressed: This study addresses the problem of how-to-measure cholinesterase levels easily in field studies.

Project Objectives: To compare several methods for measuring cholinesterase.

Executive Summary

NIOSH is providing technical assistance and funding to the California Department of Pesticide Regulation in a survey of 30 peach harvesters exposed to the organophosphate Guthion. Cholinesterase has been measured serially by two methods (conventional lab method and new field kit). Urinary phosphates have also been measured serially. Leaf residue samples have been collected. Measurements of dermal exposure were also taken. Ten unexposed controls were also measured. Initial results indicated significant cholinesterase inhibition in the exposed vs. the nonexposed, although the degree of inhibition was minor. Urinary phosphates were found in much higher levels in the exposed vs. the nonexposed.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* NIOSH is providing technical assistance to the California Department of Pesticide Regulation.

2. *Research (etiology, methodology, control):* This is a cross-sectional exposure assessment with serial biological monitoring.

3. *Intervention (populations at risk, risk factors, control actions):* Intervention depends on study results.

Evaluability Assessment

Results will be disseminated to all study participants, and in a summary form, in the pertinent literature. The impact on the target population will depend on the results.

Oklahoma (OK-1)

Project Title: Cooperative Agreement Program for Agricultural Health Promotion

Project Director: A. Pat Lewis, III

Institution, Address:
Oklahoma State University
214 AG Hall
Stillwater, OK 74078-0469
Phone: 405-744-5427 **FAX:** 405-744-6059

Personnel and Skills: Ed Barnes, NIOSH Project agricultural engineer (25%); Judy B. Oskam, NIOSH Project video coordinator and assistant extension specialist, executive producer for all NIOSH Project video and television activities and materials and co-investigator; Joseph D. Farney, TV producer/director, videographer for all NIOSH Project video and television materials; Ann Horne, on-site assessment coordinator, part-time graduate assistant.

Problems (diseases, injuries, hazards) Addressed: Child safety on the farm, chemicals and children, tractor safety, hypothermia, women and farm safety, hunting safety, grain storage facilities, fumigation, sun exposure, economics of farm injuries, general farm machinery safety, etc.

Project Objectives:

1. Cooperatively develop a computer information base of existing safety and health material with Iowa State University.

2. Produce, promote, and deliver educational video materials and television news reports focusing on agricultural safety and health.

3. Coordinate with NIOSH and the Oklahoma Extension network in a statewide on-site farm safety assessment program.

Executive Summary

The OSU/NIOSH Project has created an awareness of agricultural health and safety throughout Oklahoma. By utilizing the statewide television networks, the OSU/NIOSH Project has communicated vital health and safety information to the rural farming community. A weekly agricultural health and safety segment appears on the statewide television news program, *Sun Up*. This program has a viewing audience of between 60,000-100,000 people in Oklahoma and portions of Texas, Kansas, Arkansas, and Missouri. The OSU/NIOSH Project has also produced videos that have appeared on PBS stations across the country and that are currently distributed through the Oklahoma Cooperative Extension Video Catalog.

Coordination with state and national agricultural health and safety organizations has resulted in a number of successful collaborative efforts. Video materials include interviews with U.S. Surgeon General Dr. Antonia Novello, U.S. Public Health Service official Dr. Michael McGinnis, and Oklahoma Governor David Walters, in addition to state and local health and agricultural officials. The 30-minute television program *Field of Danger: Children on the Farm* was distributed via satellite to PBS stations nationwide. To date, the program has aired in Oklahoma, Texas, Kansas, Wisconsin, Colorado, New York, and Pennsylvania. A PBS station in Minnesota plans to air the program in April 1992.

The OSU/NIOSH Project has compiled a comprehensive agricultural safety and health video tape library that includes more than 60 video tapes. The video library includes the following topic areas: tractors, machinery and equipment, emergency medical technicians, pesticides, ATV safety, traffic/vehicle safety, youth safety, anhydrous ammonia, etc.

In coordination with Iowa State University, the OSU/NIOSH Project has developed a comprehensive computer information data base on agricultural safety and health. This material will be available to NIOSH and AHPS awardees in spring 1992. The OSU/NIOSH Project has also developed an interactive computer program for children that focuses on agricultural safety. The program tests the user's farm safety knowledge through a series of questions, definitions, and commands. The youth computer program is currently being field-tested at workshops and presentations.

The OSU/NIOSH Project participated in two statewide teleconferences (9/91 and 3/92) that focused on agricultural safety and health. These satellite teleconferences provided an excellent opportunity for extension staff throughout the state of Oklahoma to learn about agricultural safety, health, and the NIOSH project. In March 1992, the OSU/NIOSH Project sponsored a national teleconference on tractor safety, sent via satellite to 10 locations across the state. This form of communication is ideal since a large geographic area can be covered simultaneously and extensive travel is not involved.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): The on-site survey phase of the OSU/NIOSH Project is currently in the developmental stages. The on-site farm safety assessments will be conducted beginning in May 1992. The assessments will provide vital information to OSU and NIOSH about needed safety program development, attitudes about agricultural safety and health, and how and from where the Oklahoma farming community receives its information about agricultural health and safety. Since a large portion of the OSU/NIOSH Project is based on communications, the assessment will also explore the mass media in Oklahoma and how health and safety information is disseminated to the agricultural community.

The OSU/NIOSH Project also utilizes newspaper clippings of agricultural deaths and injuries as diagnostic criteria. Linkages with the Oklahoma Coalition of Churches, Ag-Link, the Oklahoma Department of Agriculture, and the Oklahoma Department of Health provide additional information about safety and health.

2. Research (etiology, methodology, control): OSU extension specialists and faculty serve as the fundamental research basis for the development of the OSU/NIOSH Project video and print materials. Survey data was collected at various workshops across Oklahoma, including grain elevator workshops, a management conference for women in agriculture, and a youth tractor safety contest.

The OSU Department of Agricultural Education has taken the lead role in the on-site farm safety assessment phase of the project. The survey results should provide project leaders with additional research about areas to target in year 3.

3. Intervention (populations at risk, risk factors, control actions): OSU/NIOSH Project personnel have attended a number of workshops and conferences in order to spread the word about agricultural health and safety -- farm-hand olympics, management conference for women in agriculture, extension annual conference, etc.

Since health professionals are especially important to the rural community, many of the OSU/NIOSH television news reports have targeted the following areas -- hypothermia, CPR, first aid, chemicals and children, etc.

In coordination with Colorado State University and the National Association of Wheat Growers, the OSU/NIOSH Project produced a video tape and television news report entitled *Kids Farm Safety Camp*. The camp was held on the campus of Colorado State University.

By far the most extensive intervention program of the OSU/NIOSH Project has been the weekly television agriculture health and safety reports which air on *Sun Up*. This information reaches an estimated 60,000-100,000 viewers each morning throughout Oklahoma and in portions of Texas, Kansas, Missouri, and Arkansas.

Evaluability Assessment

The OSU/NIOSH Project will be evaluated in a number of ways; first and foremost, whether or not the Project meets the objectives set forth in the grant proposal. Secondly, by assessing the number of materials produced and distributed, we can gauge the effectiveness of dissemination; determining the number of viewers who watch the statewide television program, *Sun Up*, will also give us an indication of the influence of our agricultural health and safety television reports. And most importantly, the on-site farm safety assessment will give OSU/NIOSH Project leaders evaluation information directly from farmers. Identifying farmers' attitudes about agricultural safety and health will assist project leaders in developing materials for year 3.

Pennsylvania (PA-1)

Project Title: Agricultural Health Promotion Systems

Project Director: Dennis J. Murphy

Institution, Address:
The Pennsylvania State University
Room 246, Agricultural Engineering
University Park, PA 16802
Phone: 814-865-7157 **FAX:** 814-863-1031

Personnel and Skills: Dennis J.Murphy, Ph.D., Farm Safety Specialist; Sam Steel, M.S., Project Associate; Tim Person, M.S., Instructor; Fokwa Ambe, M.S., Doctoral Candidate.

Problems (diseases, injuries, hazards) Addressed: Agri-chemical safety compliance, aged (elderly) tractor operators, lack of instructional packages for outreach programs, lack of interactive (hands-on) demonstrations and exhibits, lack of college-level credit courses and educational materials.

Project Objective: Development and implementation of training and educational materials and packages to deal with issues and concerns as indicated in problems above.

Executive Summary

As explained in previous executive summaries, we propose to make our agricultural safety and health state-wide organization more self-supporting; to enhance Extension and resident education opportunities for all learners; and develop innovative and relevant in-service training for health care providers, educators and trainers, and emergency medical personnel.

Prevention Activities

1. Surveillance:

a. Statistical analysis of state-wide farm accident fatalities is undertaken annually and compiled in five year reports for dissemination through Extension, media, and vocational agriculture channels.

b. Localized problems are evaluated and linkages are established with health organizations to facilitate awareness and undertake corrective actions. An example would be the dairy pipeline cleaner poisonings which involved Cooperative Extension representatives, emergency medical personnel, medical treatment centers, and nursing personnel who may be initial and/or primary contacts during emergencies.

2. Research (etiology, methodology, control): Research is not an objective of this project. Methodologies are indicated above.

3. Intervention (populations at risk, risk factors, control actions): Interventions will include suggested engineering controls and educational programming techniques.

Evaluability Assessment

A major emphasis of the final two years of the project will include qualitative evaluation. This includes evaluation packages on agri-chemical safety compliance, Extension personnel and clientele evaluations of interactive tractor, cornpicker and PTO demonstrations.

Dr. Joe A. Miller (Pennsylvania State University) is employed by the project to coordinate all evaluation efforts. He is providing guidance for the development of evaluation procedures which measure the existing knowledge level of trainees, their perceived increased level of knowledge gained, their intentions to follow through on knowledge gained, and a measure of knowledge internalized and acted upon.

Tennessee (TN-1)

Project Title: Tennessee Agricultural Health Promotion System

Project Director: Timothy G. Prather

Institution, Address:
University of Tennessee Agricultural Extension Service
PO Box 1071
Knoxville, TN 37901-1071
Phone: 615-974-7237 **FAX:** 615-974-7448

Personnel and Skills:

1. Timothy G. Prather, extension agricultural safety specialist and Institute of Agriculture safety coordinator.

2. Joel B. Lown, extension agricultural safety specialist, with expertise in developing computer-assisted educational materials.

3. Brett Asbury, graduate research assistant, with interest in tractor overturn prevention training.

4. Steven Bell, graduate research assistant, with interest in developing nonfatal farm accident surveillance systems.

5. Four part-time instructors for summer 4-H camp programs.

Problems (diseases, injuries, hazards) Addressed: Injury and fatality surveillance, tractor overturn prevention, chainsaw and tree harvesting accidents; respiratory hazards, eye protection, hearing protection.

Project Objectives: Form and strengthen cooperative agreements with other agencies and organizations in Tennessee and increase dissemination of safety and health educational materials through a variety of outlets, such as Extension, Farm Bureau, Vocational Agriculture, 4-H, and media releases.

Executive Summary

The project covers the entire state of Tennessee. A number of program activities have been conducted, including: inservice training for approximately 150 Extension agents; distribution of respirators and literature to almost 2,000 individuals in a pilot project with the Farm Bureau; safety training for approximately 4,000 youth in 4-H camp programs; presentations and demonstrations at experiment station and county Extension field days; and presentations at one industry safety day.

Prevention Activities

1. Surveillance: A project to develop an injury surveillance system will utilize information from a variety of sources and currently involves the University of Tennessee Medical Center, Tennessee Department of Labor, and Farm Bureau Insurance.

2. *Research:* The surveillance project will assist in determining the major causes of nonfatal injuries and determine priorities for developing education programs. Factors examined will include frequency and severity of accidents, causes of accidents, and the resulting losses.

3. *Intervention:* All educational programs are intended as intervention activities. Significant activities to date include field day presentations on tractor overturn prevention, respiratory health, and chainsaw safety; a statewide respiratory health awareness campaign in cooperation with Farm Bureau, and instruction for 4-H members attending summer camping programs. Several mini-grants have been awarded to local groups to aid in development of volunteer-led, community-based, safety promotion activities.

Evaluability Assessment

Dissemination effectiveness is measured by number of presentations and potential audience numbers. Effectiveness of presentations is measured by audience participation and by evaluating forms completed by audience members selected at random, with those post-tested having significantly higher rate of correct responses as compared with those who were pre-tested. Long-term evaluation will include comparison of accident rates and trends as well as possible tracking of trauma center patients to determine if those individuals experience higher rates of serious accidents than other farm workers.

Vermont (VT-1)

Project Title: Agricultural Health Promotion System

Project Director: George L. Cook

Institution, Address:
University of Vermont Extension System
RR 1, Box 2280
Morrisville, VT 05661
Phone: 802-888-4972 **FAX:** 802-888-2432

Personnel and Skills: George L. Cook, UVM extension sustainable agriculture regional specialist; Grant Wells, extension agricultural engineer; Margaret Moreau, volunteer coordinator, safety outreach assistant; Philip Winters, safety outreach assistant; Alison Valley, safety outreach assistant; Maurice Laframboise, safety outreach assistant; Sharon Whitaker, secretary II.

Problems Addressed: Agricultural, farm, and forest hazards and resulting injuries.

Project Objectives: The objective of the UVM Extension AHPS Program is to reduce the incidence of occupational injuries and illnesses on Vermont's farms and woodlots.

Executive Summary

The project encompasses all of Vermont. In addition, safety resource materials have been loaned to organizations in neighboring states. A farm hazard checklist has been developed for trained safety outreach assistants to use to identify and correct safety hazards during on-site visits. This checklist identifies not only hazards, but also safe practices currently being used on the farm. Volunteers serve to expand the delivery of the safety message to the general public. Key groups include Farm Bureau members, Future Farmers of America (FFA) chapters, 4-H groups, and area hospital staff. In addition, several Extension demonstrations and displays have been generated for use at farm and forest public events such as county fairs and field days, to provide maximum exposure of safe farm and woodlot occupational practices. A quarterly newsletter and several public service announcements have been produced for this same purpose. Three 10-minute safety videos are being produced as well.

Every UVM Extension System faculty member (agents, specialists, administrators, etc.) has been encouraged to use the last 10 minutes of any program, presentation, on-site visit, etc., to teach something pertaining to safety. To support this concept, as well as to enhance the overall farm safety program, an expanded safety library has been created. Many items are reproducible fact sheets or bulletins that may be used as handouts, while others include videos, slide programs, demonstration kits, etc.

Safety workshops and programs are provided on a seasonal basis as needed.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*
   a. Medical Center Hospital of Vermont -- (1) in-school rural and farm safety and health program - hazard awareness, prevention education at the 5th-6th grade level; and (2) development of farm accident reporting system.

b. Rabies information dissemination linkages with: Vermont Department of Health, Vermont Farm Bureau, Vermont Department of Agriculture, Vermont Department of Fish and Wildlife, Vermont Department of Forests, Parks and Recreation.

c. Nonspecific program linkages with above groups as needed.

2. *Research (etiology, methodology, control:* Research is not an objective of this project.

3. *Intervention (populations at risk, risk factors, control actions):* Not applicable.

Evaluability Assessment

The UVM Center for Rural Studies has been contracted to conduct a study of Vermont farm/forest accidents to complement existing baseline data. Early indicators are starting to present a clearer picture of the farm accident status and farm hazard awareness in the state. Future surveys will address the extent of the program's effectiveness in increasing farm/forest awareness of hazards and the reduction of injuries associated with agricultural accidents.

Virginia (VA-1)

Project Title: Agricultural Health Promotion Systems For Virginia

Project Director: G. H. Hetzel, Ph.D.

Institution, Address:
Virginia Tech
205 Seltz Hall
Blacksburg, VA 24061-0303
Phone: 703-231-5705 **FAX:** 703-231-3199

Personnel and Skills: G.H. Hetzel, Ph.D., ext. safety specialist; S. Thomason, Ph.D., ext. agricultural engineer; L. Marsh, Ph.D., ext. agricultural engineer; J.V. Perumpral, Ph.D., Department head and power and machinery expert.

Problems (diseases, injuries, hazards) Addressed: Sources and causes of agricultural injuries and illness. Identification of farm-related hazards. Intent is to prioritize remedial programs to address the problems involved most frequently.

Project Objective: Develop educational materials and programs to remediate hazards and work habits leading to injuries and illness of agricultural workers.

Executive Summary

The project encompasses all of Virginia. Pilot programs and testing of materials are linked to selected sites in 15 counties. Additionally, presentations are being made to specific audiences in various locations in Virginia on specific targeted topics such as: pesticide safety, machinery maintenance and operation, tractor safety, ATV safety. Printed materials have been developed to support identified hazards and computer-based interactive programs have been developed for use with youth groups through vocational agriculture and 4-H programs.

Prevention Activities

1. Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response): Compiling data-base of deaths from causes related to agricultural activities. Using data from various sources. Compiling data-base on injuries and illnesses caused by hazards and activities related to agricultural activities of all age groups. Working with State Department of Health, Labor, and Industry, Chief Medical Examiners Office, Medical College of Virginia, and Greensville Memorial Hospital.

2. Research (etiology, methodology, control actions):

3. Intervention (populations at risk, risk factors, control actions): Youth farm hazards -- developing educational materials and conducting programs on hazard recognition, and prevention strategies. Adult farm workers and family members -- developing educational materials and conducting programs on hazard recognition and prevention strategies.

Washington (WA-1)

Project Title: Washington State Agricultural Health Promotion System

Project Director: W.B. Symons, Ph.D.

Institution, Address:
Washington State University
Agricultural Engineering Department
Pullman, WA 99164-6120
Phone: 509-335-2902 **FAX:** 509-335-2722

Personnel and Skills: W.B. Symons, farm safety specialist; Will Bauscher, farm safety and rural farm rescue; Carolyn Grone, child and family studies; Kevin Knight, agricultural engineering.

Problems (diseases, injuries, hazards) Addressed: Reduction of farm machinery hazards, pesticide exposure levels, and farm worker training.

Project Objective: To reduce farm worker injury, fatality, and disease rates within the state of Washington.

Executive Summary

Washington State University is the second highest level of corp diversity within the United States and has some of the highest levels of pesticide application activities. Farm worker training includes farm family programs as well as sessions in Spanish for farm worker populations. Institutional training is carried out from second grade of public school through a senior level course offering at Washington State University for agricultural students. Training information is also provided to Japanese farm management trainees in the state before serving internships throughout the nation. Farm rescue training activities are supported by this project. An informal surveillance system tracks injuries and fatalities in Washington, Idaho, and Oregon. A smart orchard sprayer will be in the orchards by May 2 that will evaluate the reduction of off-target application of pesticides in apple orchards.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* The primary goal of our system is to provide information on which to write training goals for this project. The system is informal and grassroots based. Focus is upon how the accident happened. Information is shared with Washington State Department of Labor and Industries on an as-requested basis and with 15 other linkages that we have in the Pacific Northwest Region. Some news clippings are translated to Spanish and circulated to our cooperators.

2. *Research (etiology, methodology, control):* Machinery modification that will reduce the amount of off-target application of pesticides in orchards is underway. Consideration is being given to ultrasound imaging that will provide a 3-dimensional model on board the sprayer that will be able to vary sprayer output based on tree profiles. Collaboration is with the Washington State Tree Fruit Research Center in Wenatchee, Washington.

3. *Intervention (populations at risk, risk factors, control actions):* The intervention program works with farm groups such as Washington State Farm Bureau, Washington State Health Department, community colleges, Department of Labor and Industries, and State Fire School to reduce disease, injuries, and fatalities to the entire farm-working population. Training is given in

Spanish and English. To date, training has been given to second grade students up to senior citizens. This includes a new course of instruction at the upper division level within the university.

Evaluability Assessment

Research -- at the end of the project we will be able to report the amount of pesticides not applied as the result of engineering changes to an orchard sprayer. For students, we use a post-test and program quality evaluation instrument. For Hispanic programs, we use the program quality evaluation instrument only. For rural rescue people we use a multiple post-test instrument. The ultimate impact is that we hope that no person involved in training programs will appear in our surveillance system.

West Virginia (NIOSH-21)

Project Title: Evaluation of Personal Protective Gloves for Use with Herbicides

Project Director: Stephen P. Berardinelli, Ph.D.; Wayne T. Sanderson

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NIOSH Cincinnati
4676 Columbia Parkway, MS R-14
Cincinnati, OH 45226
Phone: 513-841-4314 **FAX:** 513-841-4486

Personnel and Skills: NIOSH, DSR, PTB -- one research chemist, one physical science technician; NIOSH, DSHEFS, IWSB -- one industrial hygienist.

Problems (diseases, injuries, hazards) Addressed: Exposures to herbicides.

Project Objectives: To evaluate the effectiveness of personal protective gloves in reducing hand exposure to various herbicides.

Executive Summary

Eight of the more commonly used herbicides are being tested against several brands and thicknesses of gloves made of four generic materials (nitrile rubber, butyl rubber, neoprene, and a proprietary laminate). The glove materials will be tested in a permeation cell to measure the break-through time and permeation rate of the herbicides through the material.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* This study has no surveillance component.

2. *Research (etiology, methodology, control):* This is an experimental laboratory study.

3. *Intervention (populations at risk, risk factors, control actions):* The results of the study will be used to recommend appropriate protective gloves to be worn when working with particular herbicides.

Evaluability Assessment

The results of this study will be published in trade journals and the peer-reviewed literature. The results will provide information for recommending the appropriate protective gloves to be worn when using herbicides.

West Virginia (NIOSH-22)

Project Title: Agricultural Lung Disease Research

Project Director: Gregory R. Wagner, M.D.; Stephen A. Olenchock, Ph.D.

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National Institute for Occupational Safety and Health
Mail Stop 220
944 Chestnut Ridge Road
Morgantown, WV 26505
Phone: 304-291-4474 **FAX:** 304-291-4938

Personnel and Skills: 16.8 persons (FY 91) in laboratory sciences, epidemiology, clinical investigations, and environmental disciplines.

Problems (diseases, injuries, hazards) Addressed: Agricultural workers and their families, including young adults and children, are engaged in a wide variety of occupational activities within the general field of "agriculture." Dairy and grain farmers, animal confinement workers, insect raisers, loggers, sawyers, fishers, grain handlers, cotton textile workers, and workers in biotechnology represent the many occupations where there is a potential for adverse respiratory exposures that result in responses ranging from annoyance to debilitation and death. Allergy, mucous membrane irritation, organic dust toxic syndrome, asthma, hypersensitivity pneumonitis, and chronic bronchitis are included in the wide range of responses to inhaled agricultural dusts.

The respiratory insults are likewise diverse, including exposures to airborne dusts from animals and their bedding, feed, dander, and excreta occur routinely in general farming operations and in animal confinement units. Combined exposures to airborne allergens, toxins, bacteria, fungi, their metabolites and toxins, gasses, vapors, and farm chemicals occur with regularity in agriculture. Agricultural lung disease surveillance, research, and intervention would yield results that could be directed at the development and implementation of global disease prevention strategies.

Project Objective: Through this national program, develop the strategy to address the global issues necessary to prevent agricultural lung disease.

Executive Summary

The objectives of this program are broad and national in scope. Through *surveillance*, agricultural working conditions that lead to acute and chronic lung disease will be identified. The type and magnitude of agricultural lung diseases will become defined. Through laboratory *research*, specific toxicities of airborne agents that cause adverse pulmonary responses after workplace exposure will be evaluated. Mechanisms of disease and susceptibility to disease will continue to be major components of applied laboratory research. New tools for hazard and health screening and surveillance will be identified. Through *intervention*, recommendations for work modification will directly aid the agricultural worker to avoid exposures, protect from exposures, or alter the work situation to prevent exposures.

Collaborations are established with other NIOSH divisions and with such extramural institutions as: University of California, Davis; University of Iowa, Iowa City; the New York Center for Agricultural Medicine and Health, Cooperstown, NY; the National Farm Medicine Center, Marshfield, WI; the Harvard School of Public Health, Boston, MA; the Centre for Agricultural Medicine, Saskatoon, Canada; the University of British Columbia, Vancouver, BC, Canada; the Finnish Institute of Occupational Health, Kuopio, Finland; Institute of Agricultural Medicine, Lublin, Poland; and the Shanghai Medical University, China.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):*

   a. Using existing data bases for descriptive epidemiological purposes, descriptive statistics are being compiled on frequency, location, year, sector of the agricultural industry, and occupation.

   b. Multiple cause of death tapes have been analyzed for years 1985-1987 for states with industry and occupation coding. Of 81,000 adult deaths in individuals from agricultural industries, 20,000 (24 percent) had mention of respiratory disease on the death certificate.

   c. A pilot environmental surveillance project of endotoxin at cotton gins is being pursued toward the potential development of a system by which the respiratory toxicity potential of the cotton crop can be tracked through the marketing system to end users. This may provide an "early warning" of heavily contaminated crops.

2. *Research (etiology, methodology, control):*

   a. Cellular responses to fungal spores are variable and dependent upon the species of fungi. The spores may secrete substances that could alter the inflammatory reaction of the lung. These results lead to defining the agents that should be sampled in the occupational environment.

   b. In dusts obtained from episodes of human disease, endotoxin content and complement-activating activity, as a measure of inflammation, tend to be associated generally. Additional complement-activating agents (and therefore inflammatory mediators) may be present in agricultural dusts. These studies explore agents and mechanisms of disease.

   c. Preliminary results and scientific contributions include:

   . Induction of the inflammatory pyrogen, IL-1, by extracts of agricultural dusts is not related to levels of endotoxins in the extracts. Therefore, other undefined agents are responsible.

   . A guinea pig animal model has been developed which mimics the human response to cotton dust exposure. Similar pulmonary responses, Monday accentuation, and response at low exposure levels were observed.

   . This animal model has been applied to the evaluation of agricultural dusts that have been associated with human disease. Leaf/wood compost, hay, and silage have been used.

   . Like cotton dust, agricultural dusts resulted in the following: increased breathing rate, airway obstruction, pulmonary inflammation, and priming of alveolar macrophages.

3. *Intervention (populations at risk, risk factors, control actions):*

   a. Provided spirometry equipment, training, and consultations to cooperators in the Farm Family Health and Hazard Survey and the Occupational Health and Safety Surveillance through Health Departments and Nurses in Agricultural Communities.

b. Obtained environmental samples and clinical information from cooperators for further evaluation by DRDS researchers.

c. Four Centers for Agricultural Research, Education, and Disease and Injury Prevention are currently funded (University of Iowa; University of California, Davis; Colorado State University; and National Farm Medicine Center, Marshfield, WI) and a fifth Center is planned for FY 92.

Evaluability Assessment

Positive impact on the respiratory health of agricultural workers and their families would be an expected outcome of this program. Short-term and long-term applied and focused research should result in increased surveillance information, understanding of mechanisms of lung disease caused by inhaling agricultural dusts, and increased intervention activities.

West Virginia (NIOSH-23)

Project Title: Rollover Protection for Agricultural Tractors

Project Director: John R. Etherton

Institution, Address:
NIOSH, Division of Safety Research
944 Chestnut Ridge Road
Morgantown, West Virginia, 26505-2888
Phone: 304-291-4809 **FAX:** 304-291-4904

Personnel and Skills: John R. Etherton, skills in human-machine interaction/ergonomics.

Problems (diseases, injuries, hazards) Addressed: Fatalities and serious injuries to tractor operators due to tractor rollovers.

Project Objective: To evaluate advantages and disadvantages of different rollover protection systems, making recommendations for effective intervention strategies, and supporting their implementation.

Executive Summary

A field study is to be conducted to evaluate ergonomics capabilities and limitations (particularly strength limitations) of farmers who do not have ROPS on their older tractors. Orchardists in Pennsylvania, Maryland, Virginia, and West Virginia are being recruited through the American Farm Bureau Federation to participate in data collection at farms. The protocol has been approved and HSRB approval was received in December 1991. Pilot testing began in February 1992.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Older tractors that have not been equipped with ROPS have been identified in publications authored and coauthored by the project director as an important prevention target. Older farmers have been identified as having a higher fatality rate.

2. *Research (etiology, methodology, control):* Contacts have been made with the Equipment Manufacturers Institute (tractor builder trade association), with the safety committee of the American Society of Agricultural Engineers, and with the University of Colorado, a NIOSH AHPS Grantee, to assist in the development of the research methodology that focuses on ROPS design performance, particularly when used by older farmers.

3. *Intervention (populations at risk, risk factors, control actions):* A workshop was held in June 1990 to consider intervention strategies. Leading U.S. and Canadian experts participated and proposed strategies for consideration. A publication on the results of the workshop is being submitted to the *American Journal of Public Health*.

Evaluability Assessment

The decision to work through the American Farm Bureau Federation was made to maximize the visibility of this area of safety research among the farm community that would be ultimate beneficiaries of results. Annual reports are being made at American Society of Agricultural Engineers meetings to disseminate results via the major agricultural engineering forum in the U.S.

West Virginia (NIOSH-24)

Project Title: Musculoskeletal Injuries in Agriculture

Project Director: Thomas G. Bobick

Institution, Address:
NIOSH, Division of Safety Research
944 Chestnut Ridge Road
Morgantown, WV 26505
Phone: 304-291-4884 **FAX:** 304-291-4904

Personnel and Skills: Thomas G. Bobick, safety engineer, with extensive experience in ergonomics research.

Problems (diseases, injuries, hazards) Addressed: Musculoskeletal injuries.

Project Objective: Reduce occupational injuries to the musculoskeletal system of agricultural workers by identifying and redesigning high-risk tasks.

Executive Summary

Musculoskeletal injury statistics (from the workers' compensation data base maintained by the BLS) were compiled for three of the five agricultural sectors: SIC 01--crop production, SIC 02--livestock production, and SIC 07--agricultural services. These three sectors accounted for 95% of all of the agricultural-related sprain and strain injuries. During 1984 through 1986, these three agriculture sectors accounted for more than 30,600 sprains and strains. Based on analysis of these data, two industries have been targeted for detailed evaluation: production of fruits and tree nuts (SIC 017), and landscape and horticultural services (SIC 078). Further analyses have identified the leading occupation for sustaining a back injury for these two industries. These are groundskeeper for SIC 017 and farm worker for SIC 078.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Data analyses (discussed above) have already identified the workers that have an increased potential for sustaining a musculoskeletal injury from lifting activities. Other potential data sources, that will be investigated for their applicability for identifying musculoskeletal injuries are: (a) BLS Work Injury Reports, (b) the National Safety Council Special Farm Survey, 1968-1983, and (c) the National Health Interview Survey, 1980-1987. Increased surveillance efforts are needed to develop a comprehensive view of the musculoskeletal injuries occurring in agriculture.

2. *Research (etiology, methodology, control):* Site visits have been conducted and photos of typical worker activities have been collected. Future site visits will videotape worker job activities for detailed analysis with a computer-based three-dimensional motion-measurement system. In addition, a commercially available exoskeleton device will be used to collect velocities and accelerations of the workers' trunk motion during front-to-back, side-to-side, and twisting movements during normal job activities in the two targeted industries.

3. *Intervention (populations at risk, risk factors, control actions):* Based on the data collected from site visits, and the detailed analyses of videotapes that will be collected, engineering modifications to the workplace, work activities or tools will be incorporated and evaluated.

Evaluability Assessment

Engineering modifications to the workplace or to handtools will be developed and evaluated during normal work activities. Reports presenting results of the research will be disseminated through the agriculture extension service, appropriate trade associations and groups, and the National Institute for Farm Safety. The expected results will include improved tools and work practices to reduce back injuries to agricultural workers.

West Virginia (NIOSH-25)

Project Title: Grain Handling Injury and Fatality Prevention

Project Director: Karl A. Snyder, Ph.D.

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Personnel and Skills: Karl A. Snyder, Ph.D., Agricultural Engineer.

Problems (diseases, injuries, hazards) Addressed: Severe traumatic injuries and fatalities.

Project Objective: Develop a work practices guide to provide scientifically sound recommendations on safe work practices to reduce the hazards of working with grain and grain handling systems on the farm and in other industrial environments.

Executive Summary

Grain handling practices from the harvest through on-farm storage are being examined on a national basis. Hazards have been identified through an outline of grain handling activities. Appropriate data bases, including NTOF and that of the National Injury Information Clearinghouse, are being examined to prioritize the activities, outline, and identify additional hazards. A list of state extension safety specialists has been identified. Members from this list representing major agricultural sectors (e.g. cash grain, livestock, and dairying) and appropriate industry organizations will be contacted for assistance and review of the work practices guide.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* Injury and fatality data bases from NIOSH, OSHA, and the Consumer Product Safety Commission are being used to identify sources of injuries and fatalities involved with the harvesting, transportation, and storage of grain.

2. *Research (etiology, methodology, control):* Grain handling activities have been identified from harvest through on-farm storage, including on- and off-road transport. Key word searches of injury and fatality data bases are being used to prioritize the identified hazards according to their frequency of occurrence. A work hazards guide will be developed, with appropriate emphasis placed upon those activities associated with greatest frequency of occurrence. State safety specialists representing major agricultural sectors (e.g. cash grain, livestock, and dairying) have been identified.

3. *Intervention (populations at risk, risk factors, control actions):* A grain handling safe work practices guide will be made available for distribution and use in safety presentations and workshops and by individuals.

Evaluability Assessment

Safety practices and hazard reduction techniques and devices have been made available for several years through state extension agencies and industry, but have not been implemented or accepted by workers to the extent desired. It is expected that the current period of increased safety awareness should result in a greater exposure and implementation of a state-of-the-art guide to safe work practices.

Wisconsin (WI-1)

Project Title: Wisconsin Farmers' Cancer Control Project

Project Director: Douglas Reding, M.D.

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Personnel and Skills:

Problems (diseases, injuries, hazards) Addressed: Breast cancer, colorectal cancer, melanoma, and non-Hodgkin's lymphoma.

Project Objectives: One objective is to ascertain the unique barriers Wisconsin farmers face in obtaining cancer screening and cancer treatment. The other objective is to provide relevant education materials and screening programs specifically tailored to the farming community.

Executive Summary

The Wisconsin Farmers Cancer Control Project has two components: (1) Epidemiologic Surveillance to ascertain the unique barriers Wisconsin farmers face in obtaining cancer screening and treatment; and (2) Cancer Control Education to provide relevant education materials and screening programs to the farm community.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, reporting, linkage to response):* An assessment of health services utilization and cancer risk factors will be made using a telephone survey. A total of 1500 farm households and 1500 non-farm households will be randomly selected and the male and female heads of household will be interviewed.

2. *Research (etiology, methodology, control):* A comparison of incidence and mortality for four types of cancer (listed above) will be made between farm and non-farm populations. These studies will involve the use of death certificate records from the Wisconsin Cancer Reporting System and records from the Agricultural statistics services database.

3. *Intervention (populations at risk, risk factors, control actions):* Cancer control information will be disseminated with the collaboration of the 4-H and Future Farmers of America organizations. In addition, women in the central Wisconsin rural health surveillance area will be surveyed and those of increased risk of breast cancer will be offered education for breast cancer screening.

Evaluability Assessment

Process evaluation will be assessed through the monthly project team meetings and will review recent project accomplishments and anticipated progress. Outcome and impact evaluation will be assessed within the surveillance, education, and screening activities through a series of pre- and post- surveys, and screening inventories.

Wisconsin (WI-2)

Project Title: Center for Agricultural Research, Education, and Disease and Injury Prevention: A NIOSH Cooperative Agreement Program

Project Directors: Paul D. Gunderson, Ph.D., principal investigator; Dean T. Stueland, M.D., co-principal investigator.

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Personnel and Skills:

Center Management: Paul D. Gunderson, Ph.D., senior researcher/agricultural safety specialist, National Farm Medicine Center (NFMC), Marshfield Research Foundation (MRF), Marshfield, WI; Dean T. Stueland, M.D., director, NFMC, director of emergency services, Marshfield Clinic A.O.D.A. Unit Medical Director, St. Joseph's Hospital, Marshfield, WI; Barbara C. Lee, R.N., M.S.N., assistant director, Marshfield Medical Research Foundation (MMRF), administrator, NFMC; SallyJo Lee, administrative secretary, MMRF.
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Ergonomics of Back Pain in Farmers: Ade R. Dillon, M.D., Department of Physical Medicine Rehabilitation, Marshfield Clinic; Robert D. Mason, Ph.D., rehabilitation psychologist, Marshfield Clinic; Nancy A. Haas, OT, senior occupational therapist, work performance center coordinator, St. Joseph's Hospital; Joan Olson, BSN, CIRS, physical medicine, Marshfield Clinic; Joan Olson, BSN, CIRS, physical medicine, Marshfield Clinic; MaryJo Knobloch, B.S., project manager, NFMC, MRF; Paul D. Gunderson, Ph.D., senior researcher/agricultural safety specialist, NFMC, MRF; SallyJo Lee, administrative secretary, MMRF.

Hearing Conservation Program for Agricultural Youth: Fernanco B. Bersalona, M.D., Department of Otolaryngology, Head and Neck Surgery, St. Joseph's Hospital and Marshfield Clinic; Steven K. Broste, M.S., senior biostatistician, epidemiology and biostatistics, MMRF; Kurt Olson, M.S., biostatistician, epidemiology and biostatistics, MMRF; Donald Hansen, M.S. audiologist, Marshfield Clinic; Julie Berger, M.S., audiologist, Marshfield Clinic; MaryJo Knobloch, B.S., project manager, NFMC, MRF.

Evaluation of Specific Engineering and Ergonomic Control Technology: Dean T. Stueland, M.D., director, NFMC, director of emergency services, Marshfield Clinic A.O.D.A. Unit medical director, St. Joseph's Hospital; John M. Shutske, Ph.D., agricultural safety specialist, University of Minnesota, Minnesota Extension Service Department of Agricultural Engineering, joint faculty appointment - School of Public Health Division of Environmental and Occupational

Health, MN; Richard J. Straub, Ph.D., professor, Agricultural Engineering Department, University of Wisconsin, Madison, WI; James J. Boedicker, Ph.D., associate professor, NCES, University of Minnesota; Jonathan Chaplin, Ph.D., Department of Agricultural Engineering, University of Minnesota; Cletus E. Schertz, Ph.D., professor, University of Minnesota, Department of Agricultural Engineering, St. Paul, MN; Ronald T. Schuler, Ph.D., professor, Agricultural Engineering Department, University of Wisconsin, Madison, WI; Kevin Shinners, Ph.D., assistant professor, University of Wisconsin, Madison, WI; Terry L. Wilkinson, Ph.D., extension agricultural safety specialist, University of Wisconsin.

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Professional Agricultural Health and Safety Education and Training: Joseph J. Mazza, M.D., hematologist, Marshfield Clinic, vice president, MMRF; Dean T. Stueland, M.D., director, NFMC, director of emergency services, Marshfield Clinic A.O.D.A. Unit Medical Director, St. Joseph's Hospital; Paul D. Gunderson, Ph.D., senior researcher/agricultural safety specialist, NFMC, MRF; Douglas M. Deling, M.D., Physician/Director, Marshfield Clinic, Ladysmith Center, WI; Karen A. Lappe, R.N., program manager, Wisconsin Farmers' Cancer Control Program, NFMC, MRF; Gregory R. Nycz, B.S., Director, Health Systems Research, MMRF; Richard D. Sautter, M.D., Director, Medical Research Foundation, medical editor, *Wisconsin Medical Journal*, Madison, member, Department of Cardiovascular and Thoracic Surgery, Marshfield Clinic, Marshfield, WI; SallyJo Lee, administrative secretary, MMRF.

Problems (diseases, injuries, hazards) Addressed:

1. Cumulative trauma disorders (carpal tunnel syndrome, tenosynovitis, epicondylitis, peritendinitis, and tendinitis).

2. Lower back pain/injury.

3. Physical force requirements of farm chores.

4. Hearing loss.

5. Specific farmer behaviors (non-use of hearing protective devices, inappropriate work tasking and sequencing, inattention to floor surface and stair tread grip, inappropriate work/chore posturing, task assignments to children, parental training and education of children in farm tasks/chores).

6. Engineering hazards (examples include seating devices, stair tread design, entry and discharge areas for plant material, work zone control, engine starting devices, farm equipment lighting devices).

7. Clinical awareness of agricultural worksites and human exposure to risk.

Project Objectives:

1. To conduct epidemiologic studies and natural disease investigations between 1991 and 1996 of occupational disease and injury among farmers.

2. To develop program models for the prevention of illness and injury among farmers, their employees, and their families.

3. To evaluate agricultural injury and disease prevention programs.

4. To conduct applied research and evaluation of engineering and ergonomic control technology and procedures.

5. To provide consultative services and education and training to rural educators, agricultural extension personnel, health care practitioners, and other professionals in training for careers in agricultural medicine and health.

Executive Summary

The National Farm Medicine Center (NFMC) is expanding present programs and initiating new endeavors that aim to reduce the morbidity and premature mortality experienced by our nation's farmers, their family members, and employees. Focusing on cumulative trauma disorder, back pain, hearing loss, parental perspectives relative to child involvement with farm activity, educational needs of medical personnel serving agricultural areas, and specific engineering designs for ergonomic and barrier improvements, the proposed activities are specifically tailored for midwestern agriculture, where over half of the nation's farm population now resides. Since funding was awarded in October 1991, the NFMC and its collaborating sites at the University of Minnesota (College of Agriculture, Department of Agricultural Engineering) and the University of Wisconsin (Department of Agricultural Engineering) have staffed each project area and launched initial project activity.

Prevention Activities

1. Surveillance: (a) of cumulative trauma disorders utilizing the Marshfield Epidemiologic Surveillance Area; (b) of parenting attitudes and behaviors; (c) of health enhancing or protective behaviors; and (d) of educational/training needs for medical and public health personnel. These activities involve ongoing linkage to the Midwest Center for Occupational Health, St. Paul, MN; the Occupational Safety and Health Program, University of Wisconsin, Stevens Point; the Wisconsin Area Health Education Consortium; the National Rural Health Association; the University of Wisconsin, School of Medicine; and the six state agricultural safety specialists with Region V.

2. Research:

a. Characterizing the incidence and risk factors for cumulative trauma disorders.
b. Identifying and characterizing the required physical forces associated with common farm chores/activities.
c. Designing, developing, testing, and demonstrating safety devices, both passive and barrier, that corresponds to the highest incidence of injuries among farmers.
d. Analyzing influences on farm parent decision-making regarding child involvement or presence in the farm work environment.
e. Using scientific peers for review of protocols in the back pain and engineering and ergonomic control technology projects.

The collaborating institutions or organizations include: NIOSH; University of Wisconsin, Department of Agricultural Engineering; University of Minnesota, Department of Agricultural Engineering; Farm Health and Safety Council of Wisconsin; National Institute for Farm Safety; the American Society of Agricultural Engineers; selected agricultural equipment manufacturing firms; and the Regional Rural Injury Center, University of Minnesota.

3. Intervention: Intervention involved:

a. Developing guidelines for clinical and agricultural use related to cumulative trauma disorders among male and female farmers.

b. Developing information for back injury prevention among young farmers.

c. Developing a clinical tool for prescribing a rehabilitative back maintenance program for injured farmers.

d. Developing, implementing, and evaluating an intensive hearing conservation program for high school students involved in farm work.

e. Demonstrating, to active midwestern farmers, agricultural safety devices designed for use or retrofit on agricultural equipment.

f. Developing responsive resources for use by extension safety specialists, health care providers, agricultural educators, and hygienists.

Evaluability Assessment

The following criteria will be employed:

1. Hosting scientific conferences focused on farmers' back pain and engineering and ergonomic control technology.

2. Developing manuscripts for submission to refereed or peer-reviewed journals.

3. Attending and presenting at professional conferences, seminars, symposia, clinical inservices, and workshops, or at federal or other public agency staff or project review meetings.

4. Attending NIOSH-convened conferences for the principal investigators or project directors to coordinate or collaborate with NIOSH and other agency scientists.

5. Maintaining current slate of agricultural health and safety activities that include a blend of research, educational, clinical, and community services responsive to both current agricultural health and safety concerns and explicit program requirements of NIOSH under the Cooperative Agreement Program.

6. Using the center steering committee for feedback.

7. Using management protocols to assess timeliness, impact, and reportability.

Wisconsin (WI-3)

Project Title: Wisconsin Agricultural Health Promotion System

Project Director: Ronald T. Schuler, Ph.D.

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Personnel and Skills: Ronald T. Schuler, agricultural engineer; Larry J. Chapman, associate scientist; Cheryl A. Skjolaas, outreach specialist; Terry L. Wilkinson, safety specialist.

Problems (diseases, injuries, hazards) Addressed: Musculoskeletal pain, fatal and nonfatal farm injuries, pesticide-related illnesses, and all hazards on farms but greater focus on low cost correction hazards.

Project Objectives:

1. Increase Cooperative Extension activities in (a) occupational safety, (b) occupational health promotion, (c) pesticide application safety, and (d) safety and health referral services.

2. Collaborate with (a) NIOSH in collection and evaluation of surveillance date and (b) NIOSH Centers for Agricultural Research, Education, and Disease and Injury Prevention (CAREDIP).

3. Initiate safety and health topics in college level courses.

Executive Summary

New Wisconsin extension training and educational materials developed included Rural Health and Safety Resource Directory, monthly electronic mail message, monthly milk check safety message (13,000), and safety and health displays. A baseline survey of all county faculty was conducted and preliminary analysis completed. Other activities included developing farm safety audit forms, soliciting requests for NIOSH health hazard evaluations, initiating a coroner/medical examiner surveillance program, and integrating safety and health topics into college level courses. Collaborations were begun with NIOSH in collection and evaluation of surveillance date and with NIOSH CAREDIP.

Prevention Activities

1. *Surveillance (problem recognition, diagnostic criteria, linkage to response):* (a) Collected Wisconsin farm-related fatality data using newspaper clippings, death certificates, and newly initiated state coroners reports (Wisconsin Division of Health); (b) developed health and hazard questions for Wisconsin Agricultural Statistics Service pesticide use survey (300 out of 3000 indicated pesticide-related illness); (c) prepared a preliminary report of farm equipment injuries based on U.S. CPSC data; and (d) developed rate-based fatality data using Wisconsin labor force.

2. *Research (etiology, methodology, control):* (a) analyzed 45 years of newspaper fatality data and 26 years of death certificate data; (b) evaluated Wisconsin county faculty with respect to health and safety program activities, plans, and needs using the Dillman method (response rate 295 to 305); (c) initiated an evaluation of the youth tractor and farm machinery certification program in

Wisconsin; (d) initiated the evaluation of pesticide applicators who indicated related illnesses; and (e) initiated the evaluation of two groups of farmers who participated in two newly developed extension programs. NIOSH DSHEFS assisted with survey development.

3. Intervention (population at risk, risk factors, control actions): Farm hazard identification programs focusing on farm machinery maintenance and operation. Primarily, the operator is at risk due to missing shields and nonoperating safety devices. A program using health insurance premium benefits for "safe" farms has support from the health insurance industry. By providing economic incentives, such as a ten percent reduction in insurance premiums, hazards on farms will be reduced.

Evaluability Assessment

The extension agent survey indicated (1) the greatest barrier to this programming is available time; (2) a need for integrating safety into other topics; (3) their most frequent people resource was other extension personnel; and (4) their most frequent material resources was extension videos. They indicate their most frequent audience is youth and they plan to increase programming in the area by 12 percent this year. The 300 farm workers who indicated pesticide-related illnesses are receiving further evaluation with respect to pesticide handling practices, health, and laundry practices.

Acronym List

AAHPS:	Arizona Agricultural Health Promotion System
ACAMS:	Automatic Continuous Air Monitoring System
AHPS:	Agricultural Health Promotion System
ATV:	all terrain vehicle
BLS:	Bureau of Labor Statistics
BRFSS:	Behavioral Risk Factor Surveillance System
CADIREP:	Center for Agricultural Disease and Injury Research, Education, and Prevention
CAHSPS:	California Agricultural Health and Safety Promotion System
CAREDIP:	Centers for Agricultural Research, Education and Disease and Injury Prevention
CDC:	Centers for Disease Control and Prevention
CD-ROM:	compact disc-read only memory
CEN:	Comité Européen de Normalization
CME:	Continuing Medical Education
COEH:	Center for Occupational and Environmental Health
CPR:	cardiopulmonary resuscitation
DBBS:	Division of Biomedical and Behavioral Science
DCCPF:	Demonstration Cancer Control Projects for Farmers
DNA:	Deoxyribonucleic acid
DPSE:	Division of Physical Sciences and Engineering
DRDS:	Division of Respiratory Disease Studies
DSHEFS:	Division of Surveillance, Hazard Evaluations, and Field Studies
ECU:	East Carolina University
ELISA:	Enzyme Linked Immuno Sorbant Assay
FFA:	formerly, Future Farmers of America
FFHHS:	Farm Family Health and Hazard Survey
FLC:	farm labor contractor
FTE:	full time equivalent
GC:	gas chromatography
HAZOP:	hazard and operability (study)
HHE:	Health Hazard Evaluation
HI-CAHS:	High Plains Intermountain Center for Agricultural Health and Safety
HPLC:	high performance liquid chromatography
HSRB:	Human Subjects Review Board
IA-HAASP:	Iowa Agricultural Health and Safety Service Program
I-CASH:	Iowa Center for Agricultural Safety and Health
IPM:	integrated pest management
IREH:	Institute of Rural Environmental Health (Colorado State University)
ISO:	International Standards Organization
IWSB:	Industrywide Studies Branch
MASHP:	Maine Agricultural Safety and Health Program
MOCA:	4,4'-methylene, bis (2-chloroaniline)
MMRF:	Marshfield Medical Research Foundation
NCDEHNR:	North Carolina Department of Health and Natural Resources
NCHS:	National Center for Health Statistics

NCSU:	North Carolina State University
NDSDHCL:	North Dakota State Department of Health and Consolidated Laboratories
NES:	neurobehavioral evaluation system
NFMC:	National Farm Medicine Center (Marshfield, WI)
NHANES III:	Third National Health and Nutrition Examination Survey
NIEHS:	National Institute of Environmental Health Statistics
NIOSH:	National Institute for Occupational Safety and Health
NRAES:	Northeast Regional Agricultural Engineering Service
NTOF:	National Traumatic Occupational Fatality
NURSE:	Nurses Using Rural Sentinel Events
NYCAMH:	New York Center for Agricultural Medicine and Health
OATS:	Olmsted Agricultural Trauma Study
OHNAC:	Occupational Health Nurses in Agricultural Communities
OMB:	(U.S.) Office of Management and Budget
OSHA:	Occupational Safety and Health Administration
OSU:	Ohio State University
OSU:	Oklahoma State University
PAR:	population at risk
PBS:	Public Broadcasting System
PESTS:	Pesticide Educational Safety Training Series
PI:	Principal Investigator
PSU:	Pennsylvania State University
PTO:	power take-off
ROPS:	rollover protective structure
RRIS:	Regional Rural Injury Study
SENSOR:	Sentinel Event Notification System for Occupational Risk
SIC:	Standard Industrial Classification
SPRAINS:	Sentinel Project Researching Agricultural Injury Notification Systems
USDA:	United States Department of Agriculture
WHO-NCTB:	World Health Organization - Neurobehavioral Core Test Battery

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